South Australia.

A REVIEW

OF

MINING OPERATIONS

IN THE

STATE OF SOUTH AUSTRALIA

DURING THE

HALF-YEAR ENDED DECEMBER 31st, 1915.

No. 23

Compiled by LIONEL C. E. GEE, S.M., Chief Registrar and Recorder, Department of Mines,

ISSUED UNDER THE AUTHORITY OF THE

HONORABLE R. P. BLUNDELL, M.P.,

Minister of Mines,

By F. C. WARD, J.P., *Secretary for Mines.*

Adelaide:
R. E. E. ROGERS, GOVERNMENT PRINTER, NORTH TERRACE.

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Miners' Rights and Privileges thereunder.

A miner's right is obtainable at the Department of Mines, Adelaide, also at the issuing stations in the various mining districts, at a cost of 5s.

A miner's right is in force for one year from the date of issue, and may be renewed at any time during its currency for another term of one year on payment of 5s.

The holder of a miner's right is authorised to prospect on any mineral lands for any metal, mineral, coal, or oil, and to peg out (of the prescribed shape and dimensions) gold, mineral, coal, and oil claims, and also leases of a like nature.

AREAS AND WORKING CONDITIONS.

GOLD LEASES—Maximum area, 20 acres; working conditions, one man to every five acres.

MINERAL LEASES—40 acres; one man to every 10 acres.

MISCELLANEOUS LEASES—

Salt	640 acres;	special conditions.
Gypsum	640 "	"
Mining Works	10 "	one man.
COAL OR OIL LEASES	640 "	one man to every 40 acres.
GOLD DREDGING LEASES	200 "	special conditions.
MINERAL CLAIMS	40 "	
GOLD CLAIMS	30ft. x 30ft., alluvial;	100ft. x 600ft., reef.

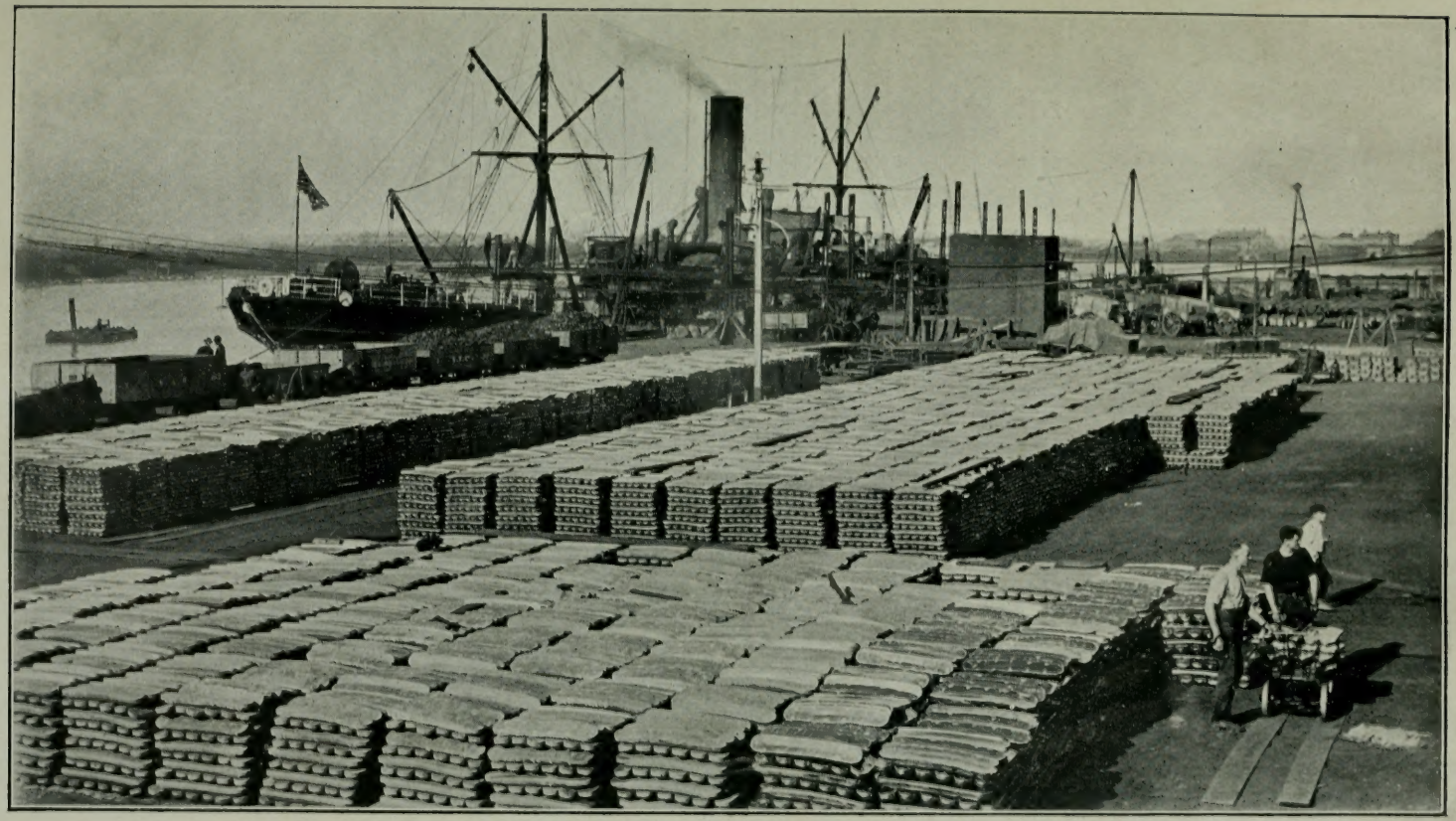
Gold claims must be constantly worked—one man for each claim—and mineral claimholders must employ two men for each claim. Amalgamation of either gold or mineral claims reduces the labor conditions by one-half until payable results have been obtained.

Gold, mineral, coal, and oil leases are granted for a term not exceeding 42 years—the two former at a rental of 1s. per acre per annum and a royalty of 6d. in the pound on net profits, the latter at a rental of 6d. per acre per annum until coal or oil is found in payable quantities, when 1s. per acre is payable and a royalty of 6d. in the pound on the net profits.

The Minister may permit, for the concentration of labor, of the amalgamation of not more than four adjoining gold or mineral leases.

Any number of gold, mineral, coal, or oil leases may be held by one person.

Licences to search for twelve months for precious stones, mineral phosphates, oil, rare metals, minerals, and earths are issued on specific mineral lands, not exceeding five square miles in area for one person, a fee of 20s. being charged for each square mile or portion thereof. These licences give a preferential right to a lease over a portion of the area, as prescribed.



Face p. 2.] Lead Storage Floor, Port Pirie Wharf. [Photo by J. Jobson

PREFACE.

THE average price of Standard Copper for the six months, is £74 4s. 4d. per ton; the range of prices was lowest (£64 10s.) on August 25th, and the highest (£86) on December 31st, the average for the year 1915 being £72 12s. 9d.

The estimated value of the mineral production of the State for the year 1915, £1,001,885, is the highest annual amount yet on record, the main factors for the increase being the larger output and higher value of the iron ore from Iron Knob in connection with the smelting works started by the Broken Hill Proprietary Company near Newcastle, New South Wales, the high average price of copper, and the appreciation in non-metallic minerals.

LIONEL C. E. GEE,

Chief Registrar of Mines.

February 29th, 1916.

INDEX.

Mining Operations during the Half-year ended December 31st, 1915.

AREA AT PRESENT HELD UNDER MINING ACTS (DECEMBER 31ST, 1915).

Nature of Holding.	Number.	Area.
Mineral leases	303	13,704 acres
Gold leases	100	1,820 "
Gold dredging leases	—	— "
Miscellaneous leases	66	16,772 "
Coal and oil leases	4	1,360 "
Mineral claims	488	19,278 "
Occupation licences	227	113½ "
Search licences	361	942,720 "
Coal and oil claims	26	16,640 "
Gold claims	10	20 "
Total holdings	1,585	1,012,427½ acres

REGISTERED FROM JULY 1ST, 1915, TO DECEMBER 31ST, 1915.

Mineral leases	9	212 acres
Gold leases	6	101 "
Gold dredging leases	—	— "
Miscellaneous leases	2	319 "
Coal and oil leases	—	— "
Mineral claims	114	4,446 "
Coal and oil claims	1	640 "
Gold claims	4	8 "
Occupation licences	18	9 "
Search licences	200	526,080 "
Miners' rights	684	—
Total	1,038	531,815 acres

MEN EMPLOYED.

Estimated number of men employed in mining and mineral works, December 31st, 1915:—

Copper	2,000
Gold	200
Salt	375
Silver-lead	25
Other minerals	300
Smelting works, Port Pirie	1,100
Raising flux, etc., in connection therewith	400
Total	4,375

GENERAL NOTES.

During the six months Government assistance from the Prospecting Vote has been given to the following mines :—

Beltana Rapid Ore Treatment Syndicate (copper).
Dorris Fabian, near Leigh Creek (copper).
Great Eastern Gold Syndicate, Wadnaminga (gold).
Kirkeek's Treasure, Nillinghoo (gold).
Nuccaleena Mine (Hunter Bros.) (copper).
Myrtle Gold Mines (Dustholes), Mount Grainger (gold).
Olivaster Silver-lead Mining Co., hundred Yankalilla (silver-lead).
Kitticoola Mine. Palmer (gold and copper)
Tumby Bay Copper Mining Co. (copper).

Report on Tarcoola by the Government Geologist will be found at pages 34-37.

Reports on the ironstone deposits at Mount Jagged and Peeralilla and the tungsten deposits at Callawonga Creek by the Assistant Government Geologist, pages 38-43.

Reports by the Inspector of Mines on the following mines :— Page

During the past six months the Government continued to lend support to the several prospecting parties engaged in searching for mineral deposits in various parts of the State.

These prospectors have carried out a very considerable amount of work in their respective spheres of action, and this work has a positive value, even though there have been no discoveries of workable deposits.

To those who are familiar with the wide expanse of metalliferous country in the northern and north-eastern portions of the State a valuable discovery would not come as a surprise, and, on the other hand, the failure to locate a new field as the result of a few short months of prospecting would not appear to exhaust future possibilities. To all such men, and to every prospector, the attitude to adopt in the face of temporary failure is to give proper recognition to the work already accomplished, and to set about breaking new country. The scope for useful work is a large one, and there is room for all.

The average price of standard copper for the six months is £74 4s. 4d., the range of prices being—highest, December 31st, £86 ; lowest, August 25th, £64 10s. ; and for the year 1915 the average is £72 12s. 9d. per ton. For the 10 years, 1906-15, the average is £67 12s. 2d. per ton.

Matters are progressing as satisfactorily at the *Pernatty Copper Mines* as could have been expected ; 11½ tons of 45 per cent. concentrates have been marketed, and the erection of the treatment plant is in progress. A report by Inspector Jones will be found on page 58.

The work done at *Mount Gunson* consists of preparing ground for the erection of machinery and plant, open cutting for exploration of ore bodies, and sinking in lakes for a sufficiently permanent supply of water for leaching purposes.

Reports show that copper mining in a small way has been carried on at the following places :—

In the North—	
Kanyaka	Red Boulder, near Old Prince Alfred Mine.
East of Boorthana	Diamond Jubilee.
Paull's	Black Eagle.
West Burra	Near Leigh Creek.
Mount Coffin	Adair Syndicate.
Nichol's Nob	Yudnamutana (Flinders Co.).
Warra Warra	Blinman.
North-East—	
Cutana	Boolcoomatta (near Putt's Well).
Near Olary.	
North-West	Monalena.
Eyre Peninsula	Tumby Bay.

With the red metal standing at such a high price it seems disappointing that more work and further outside prospecting have not been done ; but the war overshadows everything, and accounts for the difficulty in obtaining money for mining ventures, and, as many good miners have enlisted, for the disruption in the mining labor market.

During the year the well-known *Wallaroo and Moonta Copper Mines* raised 187,500 tons of ore, and treated 175,590 tons of from 3·07 per cent. to 3·30 per cent. The concentration plant has been at work all the time with satisfactory results from the heaps and slimes. Sulphuric acid and bluestone have also been produced.

About 1,800 men are employed.

A tribute party of 11 men work on the *Hamley Copper Mine*, being engaged in raising lode material (650 tons), mining, and general development work. The ore was concentrated at the company's works, returning 126 tons of concentrates and slimes, worth 28 tons 6cwts. copper.

At the *Kapunda Mine* a few tributers raised 17 tons 17cwts. of 19 per cent. ore.

Operations at the *Yelta Copper Mine* were discontinued by the Government on June 30th, 1913. Arrangements were then made whereby a party of men willing to work on tribute were allowed to do so, and a certain amount of assistance has been offered men throughout by the Government. Work has been continuous, and up to December 31st, 1915, 3,350 tons 16cwts. 1qr. 13lbs. of ore had been forwarded for treatment.

The total of the units of copper marketed is 19415·14, the average produce being 5·79 per cent.

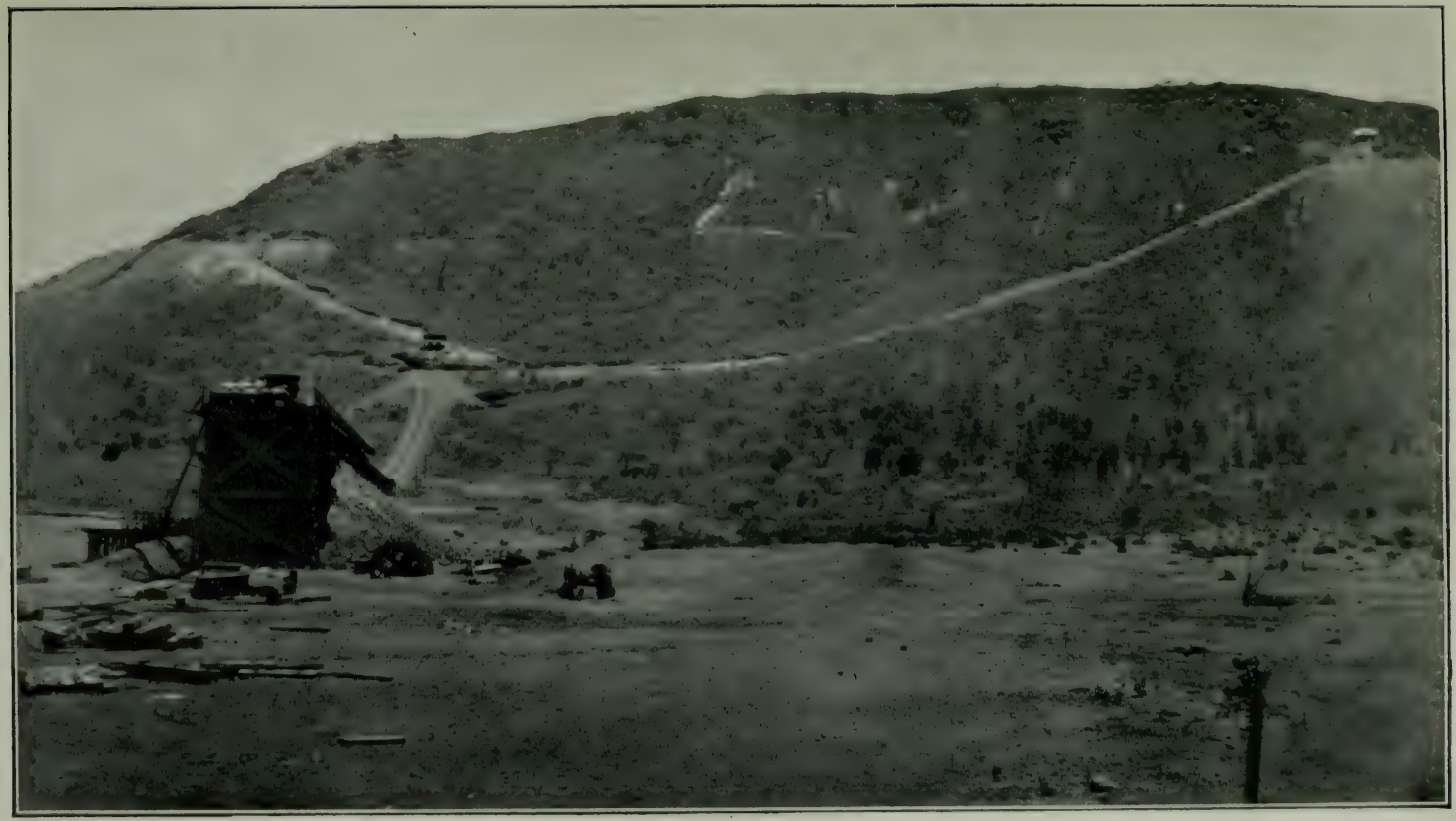
Queen Bee Mine.—A mill has been erected on the Queen Bee Mine and a small crushing has been put through, the quantity being limited by the amount of water available.

The ore from the mine is tipped on a platform, whence it is fed into a crusher of the Gates type, with a mouth opening of about 6in. x 42in. After crushing it is raised by a bucket elevator to a 16-ton bin, whence it is fed by a Challenge ore feeder to the fine crusher.

This is known as Donald's cradle crusher, and is essentially a semi-cylinder about 6ft. in diameter and about the same length, resting upon knife edge bearings and oscillated at about 40 single or 20 double rocks per minute. Three rollers, each about a ton and a half, rest on renewable tracks within the periphery of the semi-cylinder, and as the cylinder oscillates these effect the crushing.

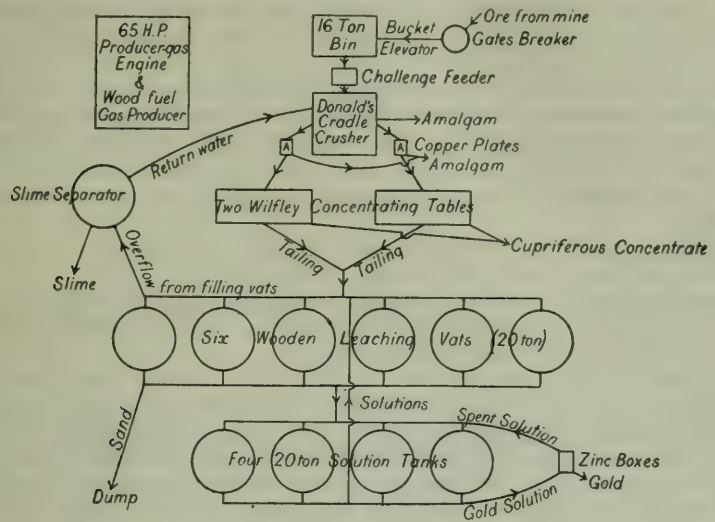
Inside amalgamation is practised, and the crushed product is discharged through screens at either end of the cylinder. It is claimed that the machine is an efficient amalgamator, and that the crushed product is very free from slimes.

The divided discharge passes over small amalgamating plates and thence over Wilfley concentrators to recover the copper. Provision is made for the tailings to be run into 20-ton cyanide vats, the overflow water going to a slime separator



Face p. 8.] Monarch Hill, Iron Knob. [Photo by J. Johnson.

from which it is returned to the crusher. The accompanying diagram shows the general principles on which the mill has been designed.



The Lux and Queen Bee Gold and Copper Mines (*vide* Review No. 22, page 12, and also Record, pages 123 and 237, and Reviews Nos. 8, 9, 10, 13, 14, 19, and 21). The general manager, Mr. J. H. Niemann, reports for the six months that 160 tons of ore have been raised, 67 tons treated, containing 25ozs. 2dwts. gold bullion, worth £90 7s. 2d., and 9 tons 2cwts. copper concentrates. Installed 68 H.P. suction gas engine and 70 H.P. wood gas producer to take the place of the steam engine. Stoped most of the ore from 160ft. level, Queen Bee shaft. Located what is apparently main ore-bearing lode in the Lux lease, dressed and stacked ore ready for crushing when water is available. Plant on ground is now capable of treating 150 tons of ore weekly, but shortage of water prevents continuous work.

East Lux and Queen Bee.—Continued search for lodes carrying payable values. The ore on both leases so far discovered, however, proves to be low grade, and cannot be worked at a profit until sufficient water is available to treat the ore in larger quantities continuously.

Deloraine Gold Mine.—Summary of operations for the six months show—

109*ft. Level.*—To intersect the footwall lode at this level No. 3 west crosscut has been put out 59ft., but only small veins of quartz carrying low values have been met with.

192*ft. Level.*—Development work has consisted chiefly of rising from south drive to facilitate stoping ; also to locate the ore chute at the 109ft. level. The width of the reef opened up has varied from 24in. to 66in., with values fluctuating from 30s. to 75s. per ton.

292*ft. Level.*—To cope with the heavy inflow of water at this level, a Duplex double action rod pump has been installed in the main shaft, and work resumed in the south end. Total length of drive 208ft. The last 50ft. in length shows an improvement in the reef in both width and value.

The bulk of the ore treated for the six months has been obtained from the south stopes at the 192ft. level. The crushing and concentrating plant has worked full time, and 2,240 tons of ore were treated for 1,195ozs. gold bullion worth £4,455 7s. 6d., and 1·45 tons copper, worth £111 1s. 2d.

Kitticoola Mine.—During the half-year under review assistance was given by the Government to the Kitticoola Mine (Port Lincoln Copper Co., Ltd.) at Reedy Creek, in order to facilitate the resumption of mining operations on the very considerable quantity of oxidised ore standing above the 240ft. level of Masterman's lode. The system of working in vogue during periods of earlier activity has left the stopes unfilled and the ore practically inaccessible. Considerations of safety and economy demanded that these empty stopes be filled, and the assistance furnished took the form of an advance to enable such timbering, provision of passes for filling from surface quarries, the filling of such stopes as were required to enable mining and milling to be resumed on a sound basis, and to enable the mine to become self-supporting.

The mill has also been overhauled, and provision is being made for obtaining water for milling from the lower workings of the mine.

The completion of this work will enable the oxidised auriferous ore to be treated, and it would appear that a comparatively small amount of development work will add considerably to the known reserves of ore.

Below water level the lode carries not only gold but copper, and the results of former milling of ore from below water level and of some recent development work are such as to justify active development work in the sulphide zone.

The utilisation of the mine water in the mill will keep the lower workings drained, and will afford opportunity, as funds are derived from the treatment of the oxidised ore, to block out such reserves of sulphide ore as will justify the designing of a plant suitable for its treatment.

While the extension of the oxidised ore to the north and south has not yet been proved to its limits, it is known that this class of ore does not extend below the 240ft. level. On the other hand the sulphide zone of Masterman's lode for as far as it has been proved (330ft. level) contains considerably greater gross values than the oxidised zones, as the amount of gold in each is comparable, and in addition copper is present as sulphide to the extent of probably not less than 2 per cent. or 3 per cent. The ore of the sulphide zone has not been delimited at either end, or in depth, and it is probable that the future prosperity of the mine will depend less upon the oxidised ore than upon the results of development work below the water level.

From the *Myrtle Gold Mine*, generally known as *The Dustholes*, near Oodla Wirra, the manager reports—"The main shaft has been sunk to 138ft., and, not having struck water, a drive was put in 60ft. W. to intersect the main lode, which was found to be dry. Some very fine prospects were obtained in the lode while driving. The country encountered was fairly hard, and underlying badly for shooting. Work was stopped in the shaft, and a 50-ton crushing taken out from the top cutting and sent to the Petersburg Government Plant with the following result:—52 tons 10cwts. for 7ozs. 15dwts. 11grs.—showing an average of 2dwts. 23grs. off the plates. Return of sands not to hand."

At *Kirkeek's Treasure* 230 tons, including 150 tons of surface dirt, have been treated at the mine plant for 56ozs. 2dwts. 22grs. of gold bullion, worth £189 6s. 1d. The tailings have not yet been cyanided.

During the six months 3½ miles of 3in. waterpiping, together with pump, engine-house, and accessories, from Symon's Well, near Waukaringa, have been removed to the Gap Well, on Koonamore, to provide a water supply for the Kirkeek's Treasure battery and cyanide plant. Other operations include stripping the surface dirt covering the lode, and generally making preparations for a vigorous start.

The water difficulty, which it is now hoped has been overcome, has always been a serious trouble at this mine.

For further particulars, *vide* Record, p. 225, and Reviews Nos. 8, 11, 13, 15, 16, 17, 18, 21, and 22.

The Thunder Queen, Wadnaminga, 677 tons from this new mine, treated at Allanson and Critchley's plant in the Virginia, yielded 598ozs. of gold bullion, valued at £1,465.

The work in progress is sinking and stoping, and the underlie shaft is now 120ft. deep.

A small parcel from the *New Milo*, Wadnaminga, gave very fair results at the Petersburg Government Plant.

A parcel of 36 tons from the *Homeward Bound Mine*, near Mannahill, yielded 33ozs. 11dwts. 18grs. of gold bullion, valued at £128 0s. 5d.

The Broken Hill Proprietary Co.'s workings at Iron Knob have supplied 236,203 tons of ironstone during the year.

Some interesting views of Iron Knob, Hummocky jetty, Port Pirie works, and Port Pirie wharf are given in this issue.

Alunite, Carrickalinga Co.—Operations have been stopped, as the company has been unable to dispose of the ore in England, probably due to the effects of the war on British manufacturing companies. The trial parcel previously reported was satisfactorily disposed of to English buyers.

A small quantity of alunite has been burnt with limestone, and the resultant product has been placed on the market for the use of horticulturists.

The results obtained from the use of this mixture of lime, and the potassium sulphate derived from the roasting of the alunite, are stated to have been highly satisfactory.

An expansion of this new industry is to be expected when the value of the potash lime product is better appreciated.

The Mount Malvern Silver-lead Mine was idle for about four months, but the directors have now obtained a complete concentrating plant, with Wilfley tables, capable of treating 5 to 6 tons of crude ore per hour, which is now in course of erection.

Practically nothing has been done at the radio-active ore deposits at *Radium Hill*, near Olary, and the *Radium Extraction Co.'s* holdings, near Mount Painter.

About 20,000 tons of gypsum have been dealt with during the year.

Two hundred licences to search for oil have been issued during the six months. Operations continue at the two bores in the South-East, Mr. Whaley and partners (near Kingston), and the South Australian Oil Wells Co. (near Robe), and it is understood that a depth of over 2,000ft. has been reached at the latter.

The scarcity of water has considerably retarded operations at the Stuart Range opal finds.

On pages 20 to 28 will be found the logs of the bores put down by the department at the Wandilta Copper Mine, near Kadina.

For further particulars regarding the Wandilta, *vide* Record, p. 144, and Reviews Nos. 8-16.

Yudnamutana.—A full report on this mining field by the Government Geologist and the Assistant Government Geologist, with illustrations, maps, and plans, has been issued as Report No. 3 of the Geological Survey of South Australia.

Face p. 12.] **Iron Knob Quarry.** [Photo by J Jobson.

DEPARTMENT OF MINES.

"THE NATIVE INDUSTRIES ENCOURAGEMENT ACT, 1872."

NOTICE OF THE OFFER OF A BONUS FOR THE DISCOVERY OF OIL.

Adelaide, July 26th, 1915.

A bonus of £5,000 is offered to the person or body corporate which first obtains from a bore or well situated in the State of South Australia 100,000galls. of crude petroleum, containing not less than 90 per cent. of products obtainable by distillation.

No application for a bonus will be considered unless the following conditions have been strictly complied with :—

1. The applicant for the bonus must have furnished to the Minister of Mines, during the progress of drilling operations—

(*a*) A monthly record of work done ;

(*b*) A full log of all bores and wells sunk, whether successful or unsuccessful ;

(*c*) Samples of materials passed through by the bores, to be taken at every 50ft. sunk, and also at every change of country encountered ;

(*d*) A declaration pursuant to "The Statutory Declarations Act, 1835," of the exact locality of each bore or well. (This should be furnished with the first monthly report on the bore or well).

2. The oil must have been stored at the bore or well from which it has been obtained until the whole 100,000galls. has accumulated.

3. The applicant must furnish with his application—

(*a*) The certificate of a licensed surveyor nominated by the Minister of Mines as to the quantity of oil so stored ;

(*b*) The certificate of the Government Analyst of the result of his analysis of samples of the oil taken by a person nominated by the Minister of Mines ;

(*c*) A declaration pursuant to "The Statutory Declarations Act, 1835," that the whole of the oil for which the bonus is claimed was obtained from the bore or well where it is stored.

4. Within 24 hours of the first discovery of oil in the well or bore, notice of such discovery must be sent to the Minister of Mines.

5. Any person who desires at any time to inspect or test the well or bore on behalf of the Minister of Mines must be granted every facility for this purpose.

6. The applicant must have done nothing contrary to the provisions of "The Mining Act, 1893," or "The Mining Act Amendment Act, 1900," or of any lease or licence granted to the applicant under either of these Acts.

R. BLUNDELL, Minister of Mines.

CRUSHING AND CYANIDING PLANTS.

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS FOR THE HALF-YEAR ENDED DECEMBER 31st, 1915.

Name of Mine.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton, in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
MOUNT TORRENS BATTERY AND CYANIDE WORKS.					
Dan O'Connell.....	Blumberg	10 0 0	7 11 0	28 5 11	56½
R. Hall.....	Forest Range	16 10 0	30 18 9	109 10 4	132¾
S. Dyke	Inglewood.....	3 7 0	0 3 18	0 13 2	4
Dan O'Connell.....	Blumberg	19 12 0	8 1 0	31 0 11	31½
Total		49 9 0	46 14 3	169 10 4	68½
Grand total since starting of battery ..*		10,686 4 3	6,160 9 13	23,285 5 0	43½
TARCOOLA BATTERY AND CYANIDE WORKS.					
Royal George	3 Miles W. of Tarcoola	100 0 0	79 3 14	300 0 8	60
Tarcoola Blocks	Tarcoola	47 0 0	20 0 2	68 15 3	29¼
Eclipse	"	5 0 0	2 9 20	8 15 0	35
Tarcoola South	"	5 0 0	1 16 2	6 6 5	25¼
Lake Labyrinth	25 Miles E. of Tarcoola	6 0 0	5 14 23	20 8 11	68
Tarcoola Perseverance	Tarcoola	50 0 0	89 15 1	329 1 3	131⅔
Curdnatta.....	"	44 0 0	14 13 1	49 2 11	22⅓
Day Dawn	"	50 0 0	28 14 8	83 19 11	33⅓
Royal George	3 Miles W. of Tarcoola	52 0 0	64 8 13	232 2 11	89¼
Gallipoli	Tarcoola	42 0 0	144 18 18	501 16 11	239
Nr. Royal George....	3 Miles W. of Tarcoola	6 0 0	5 12 18	18 16 0	62⅔
Lake Labyrinth	25 Miles E. of Tarcoola	19 0 0	5 15 12	20 10 6	21½
Day Dawn	Tarcoola	34 18 0	8 16 6	26 8 9	15
Royal George	3 Miles W. of Tarcoola	72 10 0	22 18 15	82 11 0	22¾
Curdnatta	Tarcoola	29 10 0	17 7 9	64 11 0	43¾
Wilgena	Earea Dam	13 15 0	18 10 20	69 9 7	101
Tarcoola Perseverance	Tarcoola	50 0 0	88 16 8	342 14 7	137
Last Resource	"	21 0 0	6 13 0	21 9 5	20½
Morning Star	"	25 0 0	20 6 8	59 8 7	47½
Total.....		672 13 0	646 11 6	2,306 9 7	68⅓
Grand total since starting of battery ..*		6,764 5 0	9,542 6 2	33,680 8 0	99½
GLENLOTH BATTERY AND CYANIDE WORKS.					
Sands only treated, approximately 220 tons.					
Grand total since starting of battery .. *		3,272 19 0	2,484 1 1	8,341 14 1	51

*Totals corrected to December 31st, 1915.

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS—*continued.*

Name of Mine.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton, in Shillings.
		Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
PETERSBURG BATTERY AND CYANIDE WORKS.					
Homeward Bound ..	Mannahill.....	13 15 0	13 12 17	51 11 4	75
Commonwealth.....	Parnaroo	1 5 0	0 17 16	2 17 6	46
Homeward Bound ..	Mannahill.....	4 7 0	8 15 15	35 13 6	164
" ..	"	8 0 0	4 9 13	17 3 10	43
" ..	"	5 0 0	4 16 18	17 19 7	72
Darley	Oodla Wirra.....	2 12 0	1 6 2	4 11 10	35¼
New Milo	Wadnaminga	16 17 0	14 0 9	46 14 0	55⅓
Homeward Bound ..	Mannahill.....	5 0 0	1 17 15	6 8 10	25¾
Total.....		56 16 0	49 16 9	183 0 5	64½
Grand total since starting of battery ..†		5,052 6 0	4,565 18 14	16,948 15 9	67

RETURNS FROM CRUSHING AND CYANIDING PLANTS (OTHER THAN GOVERNMENT) FOR THE HALF-YEAR ENDED DECEMBER 31ST, 1915.

Name.	Ore Treated.	Gold Bullion Recovered.	Value.	Yield per Ton, in Shillings.
	Tons cwts. qrs.	Ozs. dwts. grs.	£ s. d.	s.
DELORAINE GOLD MINE.				
Deloraine	2,240 0 0	1,195 0 0	4,455 7 6	—
*Total	2,240 0 0	1,195 0 0	4,455 7 6	39¾

* Also 1·45 tons copper, worth £111 1s. 2d.

WADNAMINGA (ALLANSON & CRITCHLEY).			
Thunder Queen.....	677 0 0	598 0 0	1,465 8 9	
Total	677 0 0	598 0 0	1,465 8 9	43¼
KIRKEEK'S TREASURE, NILLINGHOO.				
Kirkeek's Treasure (Battery treatment only)	230 0 0	56 3 22	189 6 1	—
Total	230 0 0	56 3 22	189 6 1	16½

Battery treatment only, tailings not yet cyanided.

LUX AND QUEEN BEE MINES, Vide page 8.			
Queen Bee	67 0 0	25 2 0	90 7 2	
Total	67 0 0	*25 2 0	90 7 2	27

* Also 9 tons 2cwts. copper concentrates. † Total corrected to December 31st, 1915.

TOTAL BATTERY AND CYANIDE RETURNS FROM ALL PLANTS FOR SIX MONTHS ENDED JUNE 30TH, 1915.

Name.	Ore Treated.			Gold Bullion Recovered.			Value.			Yield per Ton, in Shillings.
	Tons.	cwts.	qrs.	Ozs.	dwts.	grs.	£	s.	d.	s.
Mount Torrens	49	9	0	46	14	3	169	10	4	68½
Tarcoola	672	13	0	646	11	6	2,306	9	7	68½
Petersburg	56	16	0	49	16	9	183	0	5	64½
* Deloraine	2,240	0	0	1,195	0	0	4,455	7	6	39¾
Wadnaminga	677	0	0	598	0	0	1,465	8	9	43¼
† Kirkeek's Treasure	230	0	0	56	3	22	189	6	1	16½
‡ Lux and Queen Bee	67	0	0	25	2	0	90	7	2	27
Total	3,992	18	0	2,617	7	16	8,859	9	10	44⅓

* Also 1·45 tons copper. † Battery treatment only. ‡ Also 9 tons 2cwts copper concentrates.

COPPER.

AVERAGE MONTHLY PRICE OF COPPER, JULY TO DECEMBER, 1915.

	Standard.				Electrolitic.		
	£	s.	d.		£	s.	d.
July	76	1	4	..	91	7	9
August	68	15	1	..	82	6	2
September	69	1	2	..	85	6	4
October	72	13	7	..	88	0	0
November	77	16	10	..	93	8	2
December	80	17	10	..	100	11	4
Average for the six months	74	4	4	..	90	3	3½

RANGE OF PRICES OF STANDARD COPPER.

Highest—December 31st	£86	0	0
Lowest—August 25th	£64	10	0

AVERAGE PRICE OF STANDARD COPPER FOR THE LAST TEN YEARS.

	£	s.	d.		£	s.	d.
1906	87	8	10	1911	56	1	10
1907	82	1	11	1912	73	1	3
1908	60	0	10	1913	68	5	8
1909	58	17	2	1914	60	8	1*
1910	57	3	3	1915	72	12	9

Average for the 10 years, £67 12s. 2d.

* Quotations for nine months only.

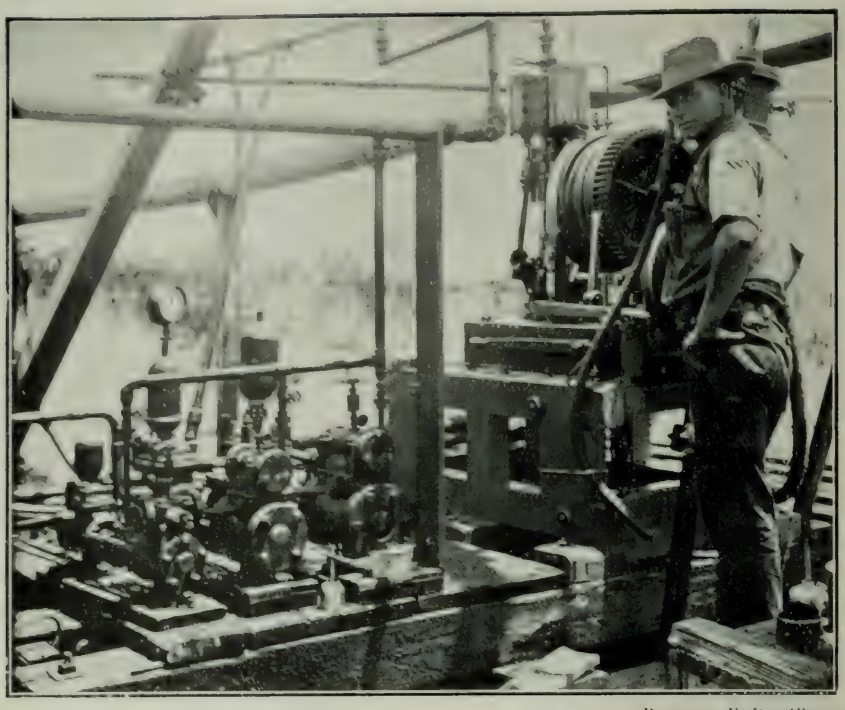


PHOTO BY F. D. O'BRIEN.

Diamond Drill for Boring an Inclined Hole.

PHOTO BY F. D. O'BRIEN.

Government Diamond Drill, Miltalie Mine.

Face p. 17.

REPORTS ON BORING OPERATIONS.

BORING OPERATIONS AT THE WALLAROO EXTENDED MINE.

Report by Mr. A. W. Matthews, Foreman.

All the boring during the six months has been done on the *Wallaroo Extended Mine*, near Kadina.

No. 3 Bore (*vide* Review No. 22, pages 19 and 20) has been drilled from 781ft. to 1,020ft. The plant was then removed to No. 4 site, and a depth of 1,005ft. reached. Boring still in progress.

No. 3 Bore.

781ft. to 802ft.—Mica schist.
802ft. to 806ft.—Mica schist.
806ft. to 824ft.—Quartz-mica schist with quartz veinlets.
824ft. to 845ft.—Quartzite and mica schist.
845ft. to 872ft.—Mica schist.
872ft. to 878ft.—Mica schist with bands of quartzite.
878ft. to 941ft.—Quartzite and quartz-mica schist with veins of quartz.
941ft. to 946ft.—Quartzite with veins of quartz and pyrite.
946ft. to 954ft.—Quartzite.
954ft. to 971ft.—Quartzite and mica schist with vein quartz.
971ft. to 972ft. 5in.—Quartz.
972ft. 5in. to 1,020ft.—Mica schist and quartzite, with veinlets of calcite and disseminated crystals of pyrite.

No. 4. Bore.

0ft. to 8ft.—Surface loam, travertine, and clay.
8ft. to 71ft.—Decomposed mica schist with small quartz veins.
71ft. to 100ft.—Mica schist with quartz veinlets.
100ft. to 144ft.—Quartz-mica schist with lenticles of pegmatite.
144ft. to 154ft.—Mica schist with sporadic crystals of pyrite.
154ft. to 167ft.—Mica schist.
167ft. to 167ft. 2in.—Quartz.
167ft. 2in. to 225ft.—Broken quartz-mica schist.
225ft. to 256ft.—Mica schist.
256ft. to 259ft.—Mica schist with a little pyrite.
259ft. to 272ft.—Broken mica schist and small quartz veins.
272ft. to 292ft.—Mica schist.
292ft. to 351ft. 6in.—Dense mica schist merging in places into quartzite.
351ft. 6in. to 353ft.—Quartzose veins with pyrite in brecciated mica schist.
353ft. to 390ft.—Brecciated mica schist with veinlets of quartz and pyrite.
390ft. to 415ft.—Brecciated mica schist.
415ft. to 420ft.—Mica schist containing veins of pyrite.
420ft. to 517ft.—Mica schist merging in places into quartzite, and containing pyrite in veinlets and as scattered crystals.
517ft. to 518ft.—Quartz.
518ft. to 520ft.—Mica schist with quartz and calcite veins.
520ft. to 521ft.—Quartzose vein matter with pyrite.
521ft. to 530ft.—Quartzite.
530ft. to 545ft.—Thin-bedded quartzite and mica schist.
545ft. to 574ft.—Mica schist with some quartzite and pyrite on cleavage surfaces.
574ft. to 577ft.—Dense quartzite with a little pyrite.
577ft. to 584ft.—Quartzite.
584ft. to 585ft.—Quartz.
585ft. to 597ft.—Quartzite and mica schist with pyrite.
597ft. to 600ft. 6in.—Quartzite.
600ft. 6in. to 621ft.—Dark-grey mica schist.

621ft. to 640ft.—Mica schist with veins of quartz.
640ft. to 657ft.—Mica schist merging into quartzite.
657ft. to 657ft. 10in.—Quartz.
657ft. 10in. to 662ft. 9in.—Mica schist merging into quartzite.
662ft. 9in. to 666ft. 6in.—Quartz.
666ft. 6in. to 670ft.—Mica schist merging into quartzite.
670ft. to 676ft.—Granular quartzite with flakes of mica.
676ft. to 722ft.—Quartzite and bands of mica schist with quartz veinlets.
722ft. to 723ft.—Vein quartz with pyrite.
723ft. to 760ft.—Quartzite merging into mica schist.
760ft. to 800ft.—Mica schist showing a little pyrite.
800ft. to 805ft. 8in.—Vein quartz and mica schist with blebs and lenticles of pyrite and a little chalcopyrite.
805ft. 8in. to 824ft.—Quartzite merging into mica schist.
824ft. to 829ft. 6in.—Mica schist with pyrite in blebs and irregular lenticles.
829ft. 6in. to 830ft.—Mica schist.
830ft. to 832ft. 6in.—Quartzite with vein quartz and pyrite.
832ft. 6in. to 880ft.—Mica schist with sporadic crystals of pyrite.
880ft. to 888ft.—Quartz-mica schist.
888ft. to 900ft.—Mica schist with sporadic crystals of pyrite.
900ft. to 911ft.—Mica schist.
911ft. to 915ft.—Mica schist merging into quartzite.
915ft. to 917ft.—Vein-quartz with included mica schist.
917ft. to 939ft.—Mica schist merging into quartzite and containing pyrite.
939ft. to 939ft. 1in.—Quartz veinlet.
939ft. 1in. to 960ft.—Mica schist merging into quartzite and containing pyrite.
960ft. to 970ft.—Quartzite.
970ft. to 980ft.—Quartzite merging into mica schist.
980ft. to 981ft.—Quartz with brecciated mica schist.
981ft. to 1,005ft.—Quartzite merging into mica schist.

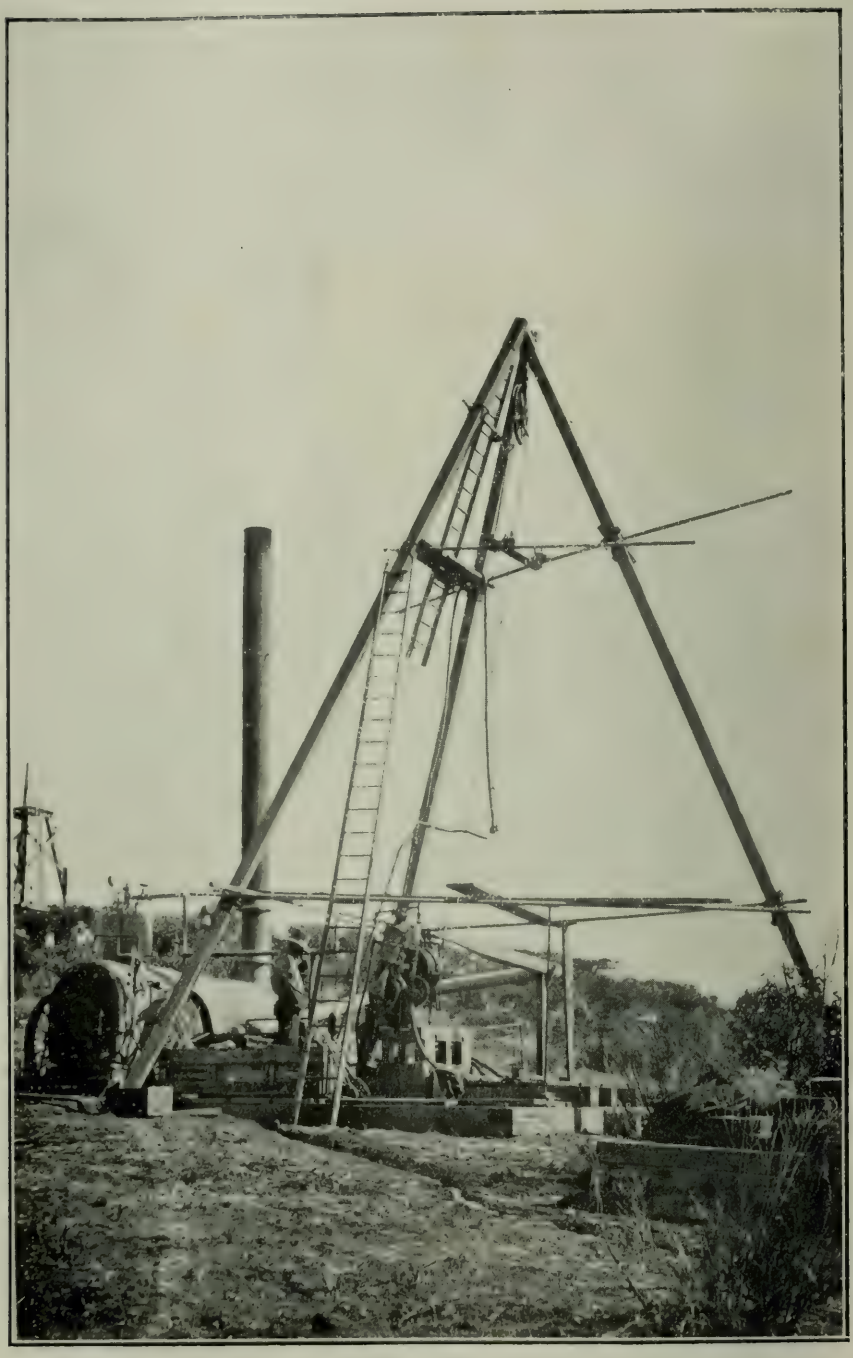
BORING OPERATIONS AT THE MILTALIE MINE, NEAR FRANKLIN HARBOR.

Report by Mr. C. F. Duffield, Foreman.

Operations were continued at No. 1 Bore (*vide* Review No. 22, page 21), and at 250ft. it was found necessary to ream the hole out to take 2⅜in. casing, owing to the country from 231ft. falling in badly. This being completed, boring was resumed to a depth of 341ft.

The country passed through being—

250ft. to 277ft. Highly felspathic biotite schist.
277ft. to 282ft. Siliceous biotite schist.
282ft. to 283ft. Siliceous and felspathic schist.
283ft. to 287ft. Felspathised schist.
287ft. to 289ft. Siliceous pegmatite.
289ft. to 330ft. Felspathised schist.
330ft. to 338ft. Soft broken sandstone.
338ft. to 341ft. Granitic rock.



[Photo by F. D O'Brien.

Government Diamond Drill, Miltalie Mine.

Face p. 19.

No. 2 Bore is situated 360ft. W. of outcrop and was located so as to cut the lode at 300ft.

Angle of bore 20ft. in 100ft.

Magnetic bearing from No. 1 Bore 282°, distance 117ft. 6in.

Total depth from surface 570ft.

The country passed through being as follows :—

Surface to 3ft.	Soil, clay, travertine limestone rubble.
3ft. to 8ft.	Decomposed micaceous schist.
8ft. to 60ft.	Coarse-grained pinkish gneiss, the foliation planes (and cleavage) being inclined at 45° to direction of bore.
60ft. to 151ft.	Similar to above, but finer grained.
151ft. to 154ft.	Pinkish-grey granite of medium grain with pyrite in narrow veinlets.
154ft. to 162ft.	Dark-grey fine-grained gneiss with pyrite.
162ft. to 217ft.	Pink coarse-grained gneiss.
217ft. to 219ft.	Dark greenish-grey mica schist.
219ft. to 268ft.	Pink coarse-grained gneiss.
268ft. to 303ft.	Coarse pale-grey gneiss.
303ft. to 420ft.	Coarse pink gneiss with sporadic crystals of pyrite.
420ft. to 570ft.	Medium grained grey gneiss with scattered crystals of pyrite.

No. 3 Bore is situated 153ft. N. from No. 1 Bore, and 240ft. from the outcrop, and was located so as to cut the lode at 200ft.

Angle of bore 20ft. in 100ft.

Erection of plant in progress.

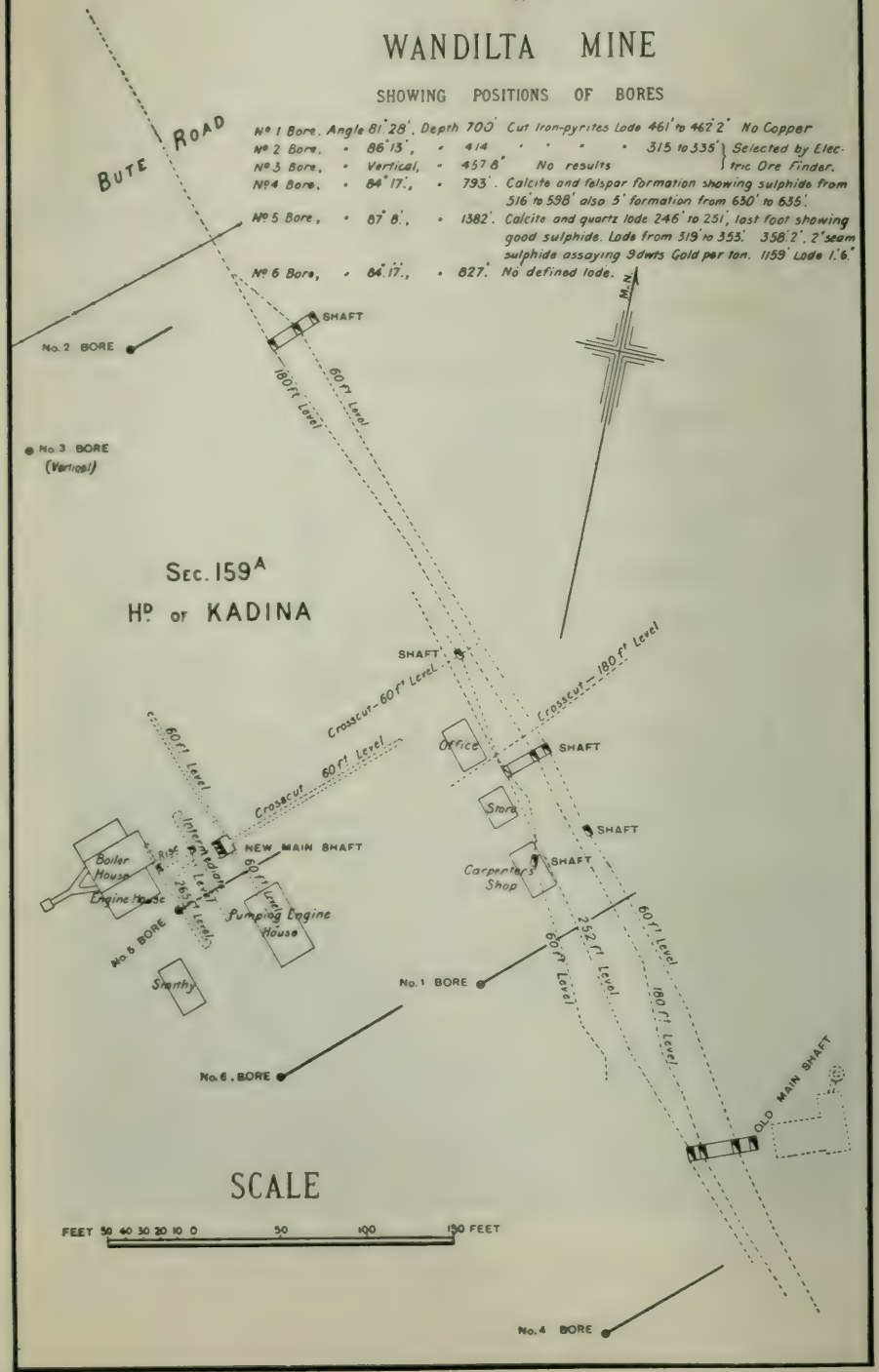
PLAN

OF

WANDILTA MINE

SHOWING POSITIONS OF BORES

No 1 Bore.	Angle 81°28'.	Depth 700'	Cut Iron-pyrites Lode 461' to 462'2"	No Copper
No 2 Bore.	" 86°13',	" 414	" " " " 315 to 335'	Selected by Electric Ore Finder.
No 3 Bore.	" Vertical,	" 457'8"	No results	
No 4 Bore.	" 84°17',	" 793'.	Calcite and felspar formation showing sulphide from 516' to 598' also 5' formation from 630' to 635'.	
No 5 Bore,	" 87°8',	" 1382'.	Calcite and quartz lode 246' to 251', last foot showing good sulphide. Lode from 319' to 353'. 358'2". 2" seam sulphide assaying 9dwts Gold per ton. 1159' Lode 1'6".	
No 6 Bore,	" 84°17',	" 827'.	No defined lode.	



SOUTH AUSTRALIA
DEPARTMENT OF MINES
No. 1 BORE WANDILTA MINE

Direction of Bore N.E. Hundred of KADINA
Angle of Bore 81° 28' Section No. 159A
Location: Distant 177' from the centre of the New Main Shaft on a Magnetic Bearing of 105°

DEPTH FROM SURFACE Ft. In.	SECTION	THICKNESS Ft. In.	DESCRIPTION OF ROCK	REMARKS
8		8	Surface clay and limestone	3½" Bore to 8'
		50	Sandstone and quartz leaders	
58				
64		6	Quartzite	
72		8	Quartz and ironstone	
88		14	Quartzite	
87 6		1 6	Quartz	
95		7 6	Quartzite and blue country rock	
		52	Hard country	
147				
		41	Formation of porphyry, quartz and ironstone.	
188				
191		3	Quartzite	2⅜" Bore to 189'.
214		23	Country showing calcite.	
216		2	Quartz showing yellow sulphide	
		78	Formation of quartz, quartzite and calcite showing iron pyrites and sulphide	
294				
		93	Slate country carrying iron pyrites and a little sulphide	
387				
398		11	Hard quartzite.	
403		5	Country rock.	
404		1	Solid Calcite showing sulphide.	
406		2	Showing calcite and little sulphide	
		52	Hard broken country mostly quartzite.	
458		3	Slate	
461		1 2	Solid iron pyrites	No copper.
462 2				
		62 10	Slate	
525				
535		10	Calcite and felspar.	
		95	Slate	
630		5	Calcite, felspar and hornblende.	
635		12	Blue country.	
647		2	Quartz and spar.	
649		8	Country	
657		2	Calcspar.	
659 6		6 6	Country	
664		4	Formation quartz & spar showing little sulphide.	
671		7	Hard broken country	
679		8	Calcite.	
686		7		
700		14	Country rock.	1¾" Bore to 700'.

Date completed 15:7:1907.

A.W. MATTHEWS.
Foreman.

W.H. MATTHEWS.
Supervisor of Boring Operations.

SOUTH AUSTRALIA
DEPARTMENT OF MINES
No. 2 BORE WANDILTA MINE

Direction of Bore N.E. — Hundred of KADINA — Location: Distant 290' from the centre of the New Main Shaft on a Magnetic Bearing of 337°
Angle of Bore 86° 13' — Section No. 159A

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
		15.	Surface clay and sandstone.	3½" bore to 15'.
15		45.	Sandstone.	
60		137.	Broken country rock.	
197		4.	Country with small quartz veins.	
201		2.	Quartz.	
203		11	Broken country.	
214		1	Country showing little copper pyrites	
215		62.	Broken country.	
277.		2.	Quartz and spar with little sulphide.	
279		36.	Soft country	
319.		10	Lode heavily charged with iron pyrites.	
325.		10.	Lode, iron pyrites.	2⅜" bore to 332'.
335.		79.	Country rock.	
414				1¾" bore to 414'.

Date completed 10.3.07.

A.W. MATTHEWS
Foreman

W.H. MATTHEWS
Supervisor of Boring Operations

SOUTH AUSTRALIA

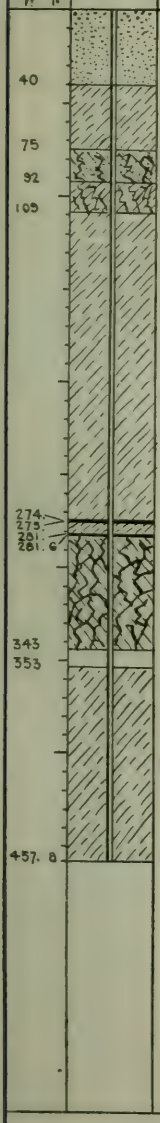
DEPARTMENT OF MINES

No. 3 BORE WANDILTA MINE

Direction of Bore ——— Hundred of KADINA

Angle of Bore Vertical Section No. 159A

Location: Distant 267' from the centre of the New Main Shaft on a Magnetic Bearing of 322°



DEPTH FROM SURFACE Ft. In.	THICKNESS Ft. In.	DESCRIPTION of ROCK	REMARKS
	40.	Surface loam, sandstone and micaceous schist.	3½" bore to 40'.
40	35	Blue country rock	
75	17	Quartz & small vein of red oxide of copper.	
92	17	Country showing mica.	
109			2⅜" bore to 142'
	165	Country rock.	
274	1	Calcite showing sulphide.	
275	6	Country	
281	0 6	Calcite showing sulphide	
281. 6	61. 6	Country showing calcite bands	
343			
353	10.	Hard country.	
	104. 8	Settled country. Last 50' very hard.	
457. 8			1¾" bore to 457' 8".

Date completed 25·10·1907.

A.W. MATTHEWS. Foreman.

W.H. MATTHEWS. Supervisor of Boring Operations.

SOUTH AUSTRALIA

DEPARTMENT OF MINES

No. 4 BORE WANDILTA MINE

Direction of Bore N.E. Hundred of KADINA Location Distant 371' from the centre of the New Main Shaft on a Magnetic Bearing of 130°

Angle of Bore 84° 17' Section No. 159A

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
7.		7.	Surface clay and limestone	
		70.	Country rock	
				3½" bore to 68'.10."
77.		7.	Quartzite	
83.		6.	Country rock with quartz veins.	
88.		5.	Country rock and quartzite.	
		84.	Grey country with calcite bands.	
179.				
195.		16.	Broken country.	
206.		11.	Grey country with quartz veins.	
		41.	Broken country.	
247.				
		26.	Grey country.	
273.				
282.		9.	Quartzite.	
285.		3.	Calcite.	
		125.	Igneous rock.	
				2⅜" bore to 385'.6."
410				
		106.	Country mixed with calcite.	
516				
		82.	Calcite and felspar lode formation showing sulphide	
598				
		32.	Country rock.	
630				
635		5	Lode formation, 1'8" showing sulphide freely.	
		158.	Country rock.	
793				1¾" bore to 793'.

Date completed 25:2:1908.

A.W. MATTHEWS
Foreman

W.H. MATTHEWS
Supervisor of Boring Operations.

SOUTH AUSTRALIA

DEPARTMENT OF MINES

No5 BORE WANDILTA MINE

Direction of Bore. N.E. Hundred of KADINA.
Angle of Bore 87° 8' Section No. 159A
Location: Distant 44' from the centre of the New Main Shaft on a Magnetic Bearing of 202°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
ft in		ft in		
12		12	Surface loam and limestone.	
		67	Broken sandstone.	
79				
92		13	Country rock.	
		118	Calcite formation with quartz and iron leaders.	3½" bore to 158'.
210				
		36	Country rock [sulphide.	
246		5	Calcite & quartz lode. Last foot showing good	
251		41. 5	Country	
292. 5				
293 1		8	Lode showing good sulphide.	
319		25. 11	Country.	
		34	Lode	
353		5.	Country. Then 2" vein of sulphide.	Assayed 9 dwts. of gold per ton.
358			Country	
369		11.	Calcite	
371		2	Calcite showing sulphide.	
373		2	Country. Then 6" calcite showing sulphide.	
389. 6		16. 6	Country	
399		10 6	Country heavily charged with magnetic iron.	
410		11	Country	
416		6	Calcite showing sulphide.	
418 6		2. 6	Country	
437 5		18. 7	Lode showing sulphide and iron pyrites.	
442 2		4. 11	Country	
507		64. 10	Calcite showing sulphide	2⅜" bore to 517'.
511		4 0		
		229.	Country.	
740				
		66.	Felspar formation mixed with quartz and calcite carrying a little sulphide.	
806				
		353.	Country rock.	
1159.				
1160. 6		1 6	Lode showing sulphide and iron pyrites.	
		221. 6	Country rock.	
1382.				1¾" bore to 1382'.

Date completed 15:9:1908.

A.W. MATTHEWS. Foreman

W.H. MATTHEWS. Supervisor of Boring Operations

SOUTH AUSTRALIA

DEPARTMENT OF MINES

No6 BORE WANDILTA MINE

Direction of Bore N.E. ... Hundred of KADINA ... Location { Distant 142' from the centre of the New Main Shaft on a Magnetic Bearing of 153°

Angle of Bore 84° 17' ... Section No. 159A

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
F. I.		F. I.		
6		6	Surface clay and limestone.	
		80.	Sandstone mixed with quartz & iron veins.	3½" bore to 44'.
86				
106		20.	Calcite, quartzite & quartz & iron veins.	
		63.	Calcite mixed with ironstone seams.	
169				
		40	Blue country rock.	2⅜" bore to 204'.
209				
		53	Calcite formation showing a little mineral.	
262				
		56.	Blue country rock.	
318		2.	Calcite.	
320		16.	Blue country rock.	
336. 8.		8.	Calcite showing sulphide.	
350		13. 4.	Blue country rock.	
351. 5.		1. 5.	Calcite	
364. 7.		12. 7.	Country rock.	
365. 6.		1. 6.	Calcite showing sulphide.	
		377. 6.	Hard blue country rock mixed with calcite veins.	
743.		3.	Seam of sulphide.	
743. 3.		18. 5	Country rock	
762.		1.	Showing sulphide.	
763.				
		64.	Blue country rock.	
827.				1¾" bore to 827'.

Date completed 29.4.1909.

A.W. MATTHEWS. Foreman.

W.H. MATTHEWS. Supervisor of Boring Operations.

SOUTH AUSTRALIA
DEPARTMENT OF MINES
No7 BORE WANDILTA MINE

Direction of Bore N.E
Angle of Bore 78° 41'
Hundred of KADINA
Section No. 159B
Location: About 230' from the S.E. corner of Sec. 159B on a Magnetic Bearing of 251°

DEPTH FROM SURFACE	SECTION	THICKNESS	DESCRIPTION OF ROCK	REMARKS
Ft In		Ft In		
10		10.	Surface loam and clay.	
		226	Kaolin and sandstone.	
				3½" bore to 168'.
				2⅜" bore to 236'.
236.		2.	Lode.	Assayed 3% copper.
238.		15.	Kaolin and sandstone	
253.				
		157.	Blue country with seams of calcite and felspar.	
410				
		75.	Blue country with seams of calcite.	
485				
		43.	Blue country with seams of calcite and spar.	
528				
540		12.	Calcite formation carrying sulphide.	
551		11.	Blue country and spar.	
553		2.	Calcite showing sulphide.	
558		5.	Calcite and grey country.	
565		1.	Calcite showing sulphide.	
571		13.	Calcite and grey country.	
		2	Calcite showing sulphide.	
		75	Country rock.	
646				1¾" bore to 646'.

Date completed 20:7:1910.

A.W. MATTHEWS
Foreman

W.H. MATTHEWS.
Supervisor of Boring Operations.

SOUTH AUSTRALIA

DEPARTMENT OF MINES

No 8 BORE WANDILTA MINE

Direction of Bore N.E
Angle of Bore .. 78° 41'

Hundred of KADINA
Section No. 159 B

Location: About 115' from the S.E. corner of Section No. 159 B on a Magnetic Bearing of 251°

DEPTH from SURFACE ft. in.	SECTION	THICKNESS ft. in.	DESCRIPTION of ROCK	REMARKS
14		14.	Surface clay and limestone.	4½" bore to 26'
		83.	Kaolin and sandstone.	3½" bore to 78'
97				
		323.	Country with bands of calcite.	2⅜" bore to 254'
420				
		383	Country rock mixed with calcite and felspar.	
803				1¾" bore to 803'.

Date completed 7.9.1910

A.W. MATTHEWS.
Foreman.

W.H. MATTHEWS.
Supervisor of Boring Operations.

SUBSIDIES.

The Legislature provided in the Mining Act, 1893, and in previous measures for the encouragement of Mining.

The following schedule shows what subsidies have been paid from the inception of the system to December 31st, 1915, and the sums repaid. In the ordinary way these repayments are made from profits—50 per cent. of such profits being devoted to repayments. In two instances only have the profits won enabled full repayments to be accomplished—the Crystal Mine, at Echunga, which repaid £76 7s. 6d. from that source, and the once-famous New Alma and Victoria Mine, Waukaringa, which repaid in full the first subsidy, £3,000. The remainder of the recoveries was derived from sales of mining plant held as security. The total of the subsidies advanced is £62,554 16s. 6d., of which £7,659 16s. 4d. has been recovered, leaving a debit balance of £54,895 0s. 2d. Portion of this outstanding debt is represented by machinery that has fallen into the hands of the Government; add to this the value of the metals won, and the State in general will probably have benefited beyond the money value of the debit balance.

STATEMENT OF SUBSIDIES PAID FROM COMMENCEMENT TO DECEMBER 31ST, 1915.

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Adelaide Crushing, Grinding, and Amalgamating Mill Co.	—	100	0	0	—		
Algebuckina Gold Mining Syndicate	Algebuckina	52	10	11	52	10	11
Alma Extended Gold Mining Co.	Waukaringa	3,000	0	0	172	5	0
Backhouse, T. S.	Worturpa	100	0	0	—		
Barossa Enterprise Gold Mining Coy.	Barossa, Hundred of	232	2	6	—		
Belalie Copper Mining Syndicate	Bundaleer	392	12	3	—		
Beltana Rapid Ore Treatment Syndicate	Near Beltana	577	8	9	—		
Bevilaqua & Angel	Palmer (near)	57	18	0	—		
Bird-in-Hand Gold Mining Co., Ltd.	Woodside	3,000	0	0	—		
Blackfellow's Creek Gold Mining Co., Ltd.	Kuitpo, Hundred of	660	6	7	35	0	0
Callington Copper Mining Co.	Callington	148	8	7	—		
Cockburn Copper Mining Co., N.L.	Mutooroo	273	18	5	173	13	8
Commonwealth Silver-lead Co., Ltd.	Strathalbyn, Hund. of	750	0	0	70	17	9
Copper Hill Mining Co., N.L.	Kadina	391	15	0	115	0	0
Cornwall Copper Mining Syndicate, N.L.	Kadina, Hundred of	500	0	0	—		
Countess of Jersey Gold Mining Co., N.L.	Wadnaminga	321	0	0	—		
Cowell Consolidated Silver and Copper Mines	Hds. Miltalie & Hawker	406	9	8	12	9	6
Currency Creek Copper Mining Co.	Currency Creek	28	6	5	20	0	3
Crystal Gold Mining Co.	Echunga	563	17	6	176	7	6
Davis, A. (Dorris Fabian Mine)	Leigh's Creek, Near	357	0	0	—		
Ding Dong Copper Mining Syndicate	Kanmantoo, Hund. of	124	0	4	—		
Duke of Cornwall Gold Mining Syndicate	Mount Pleasant	458	17	4	43	10	0
Eagle Silver Mining Co, Ltd.	Glen Osmond	500	0	0	—		
Ediacara Consols Silver Mining Co., N.L.	Ediacara	651	12	1	465	17	0
Enterprise Copper Mining Co., N.L.	Barossa, Hundred of	150	0	0	9	16	0
Enterprise Excelsior (Barossa Amalgamated)	"	2,000	0	0	—		
Eureka Gold Mining Co., Ltd.	Woodside	1,500	0	0	—		
Fifth Creek Central Silver and Copper Mining Co., N.L.	Fifth Creek	253	2	4	—		
Fortress Hill Mining Syndicate	Fortress Hill	60	0	0	—		
Glenloth Mining, Battery, & Options Co., N.L.	Glenloth	515	4	7	515	4	7
Glenloth Wells Pioneer Blocks Co., Ltd.	"	100	0	0	22	18	5
Great Eastern Gold Syndicate, N.L.	Wadnaminga	300	0	0	—		
Gumeracha Gold Mining Syndicate	Gumeracha	75	0	0	—		
Golden Point Claims	Wonna	50	0	0	—		
Great Ironclad Gold Mining Co.	Teetulpa	218	6	9	—		
Hakendorf, C. H., and Williams, J. (Glenmarkie Mine)	Glenloth	221	17	6	—		
Hamley Copper Mining Co.	Wallaroo	2,100	0	0	—		
Homeward Bound and Klondyke Gold Mines, N.L.	Mannahill	192	17	1	35	18	9

STATEMENT OF SUBSIDIES PAID—*continued.*

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Heithersay, J. (Kirkeeks Treasure Mine) ..	Waukaringa	819	8	0	—		
Hunter Bros. (Lady Millicent Mine and Nuccaleena Mines)	Mochatoona	665	2	8	—		
Ireby Gold Mining Syndicate	Mount Grainger.....	35	4	3	—		
Kanappa Copper Mining Co.	Hundred Angas	146	19	11	1	5	0
Kanmantoo Copper Mines Syndicate, N.L...	Kanmantoo.....	150	2	1	—		
Kingsborough, W. A. (Benowrie Mine)	Near Cutana	31	18	6	—		
Kirkeek's Treasure Gold Mining Co.	Waukaringa	691	8	1	—		
King's Bluff G.M. Co., N.L.....	Olary	622	0	8	—		
Kohinoor Gold Mining Co., N.L.	Kangaroo Island	100	0	0	—		
Kohinoor Mine (H. G. Taylor).....	"	200	0	0	—		
Lady Alice Gold Mining Co.....	Barossa, Hundred of ..	1,797	2	3	—		
Lady Franklin Syndicate	Port Lincoln	200	0	0	40	0	0
Leigh's Creek South Coal Mining Co., N.L.	Leigh's Creek.....	95	16	4	95	16	4
McMurtie's Claims	Kuitpo, Hundred of ..	199	19	11	—		
Mingary Gold Mining Co.....	New Luxemburg	400	0	0	—		
Montacute Gold and Copper Mining Co., N.L.	Sixth Creek	400	0	0	—		
Mount Victoria Mine	Bimbowrie	50	0	0	—		
Mount Malvern Silver Mining Co.	Blackwood	491	3	6	—		
Mount Malvern Silver-lead Mining Co., N.L.	Clarendon	1,539	6	4	—		
Mount Pangæus Gold Mining Co.	Hahndorf (near).....	56	1	4	—		
Mount Monster Gold Mining Syndicate	Kuitpo, Hundred of ..	350	0	0	1	0	0
Mt. Grainger Ironclad Gold Mining Syn., Ltd.	Mount Grainger	21	18	10	—		
Mount Torrens Gold Mining Co.	Mount Torrens	1,000	0	0	—		
Mount Remarkable Mining Co., Ltd.	Wongyarra, Hund. of	122	8	1	15	0	0
Musgrave Ranges Prospecting Association ..	Musgrave Ranges	47	2	0	—		
Mount Painter Corundum and Gem Syndicate	Mount Painter	47	3	1	—		
Morning Star Gold Mining Co.	Teetulpa	68	4	6	—		
Mutooroo Copper and Silver Mining Co., Ltd.	Mutooroo	500	0	0	500	0	0
Myrtle Gold Mines, N.L.	Hd. Coglin.....	288	9	3	—		
Nackara Proprietary Copper Mining Co., N.L.	Nackara	100	0	0	—		
Nackara Proprietary Gold Mining Syndicate.	Nackara	100	0	0	—		
New Banksia Gold Mining Syndicate	Nairne	250	0	0	—		
New Alma and Victoria Gold Mining Co., Ld.	Waukaringa	3,000	0	0	3,000	0	0
New Ajax Consolidated Gold Mining Co., N.L.	"	750	0	0	—		
New Era Gold Mining Co., Ltd.	Woodside	1,000	0	0	—		
New Glenloth Battery and Mining Co., N.L.	Glenloth	750	0	0	—		
New Medora and Grainger Gold Mines Syn., N.L.	Mount Grainger	1,421	9	9	—		
New Mingary Gold Mining Co.	New Luxemburg	250	0	0	—		
New Mount Grainger Gold Mines, N.L.....	Mount Grainger.....	393	7	1	220	0	0
Northern Mining and Smelting Co., N.L. ..	Mount Rose	350	0	0	3	15	0
North Nairne Gold Mining Co.....	Nairne	500	0	0	—		
North-West and West Australian Pros. Co..	North-west of S.A.	104	9	7	—		
North-West Prospecting Association, N.L...	Tarcoola	150	0	0	—		
Nil Desperandum Teetulpa Devt. Co., N.L. .	Teetulpa	64	14	4	20	5	6
Nilpena Copper Mining Co., Ltd.....	Blinman	290	5	3	—		
Olivaster Silver-Lead Mining Co., N.L.	Hundred Yankalilla ..	300	0	0	—		
Onkaparinga Dredging and Mining Co., and Echunga Propy. Hydraulic Gold Sluicing Co.	Biggs' Flat	1,050	0	0	700	0	0
Paull's Consolidated Copper Propy., N.L. ..	Burr Well	525	0	0	16	13	0
Parara Mining Co., N.L.	Maitland	571	3	5	—		
Paringa Mining Syndicate	Callington	399	16	8	244	0	0
Paringa and West Kanmantoo Consolidated Copper Mine, N.L.	"	1,144	3	4	10	5	0
Pioneer Gold and Copper Mining Syndicate	"	95	15	6	—		
Polmear, W. J. L.	Kadina	800	0	0	—		
Port Lincoln Copper Co., Ltd.	Reedy Creek	200	0	0	—		
Queen Bee Mining Co., N.L.	New Luxemberg	250	0	0	250	0	0
Quorn Manganese and Silver Mining Co. ...	Quorn	10	9	10	—		
Rapid Bay Silver Mining Co., N.L.....	Yankalilla, Hund. of..	136	2	4	—		
Robertstown Bright Silver Lead Mines	Hd. Bright	170	5	11	—		
Royal Charlie Gold Mining Co.....	Mannahill	153	18	5	—		

STATEMENT OF SUBSIDIES PAID—*continued.*

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Rees, R., Ajax Mine	Waukaringa	604	14	5	—		
Sixth Creek Gold & Copper Mining Co., L.N.	Sixth Creek	161	1	11	—		
Stainbank, A. T.	Fifth Creek	70	14	11	—		
Sliding Rock Copper Proprietary, N.L.	Sliding Rock	2,000	0	0	27	17	0
Tarcoola Blocks Gold Mining Co., Ltd.	Tarcoola	3,995	5	2	150	19	11
Tarcoola Enterprise Gold Mining Co., N.L.	"	100	0	0	19	10	4
Tarcoola Proprietary Gold Mines, N.L.	Tarcoola	150	4	4	9	15	0
Teatree Gully Gold Mining and Pros. Assn.	Teatree Gully	234	5	7	—		
Teetulpa Mining and Crushing Co.	Teetulpa	349	11	4	—		
Teetulpa Prospecting Syndicate	"	49	15	6	—		
Tumby Bay Copper Mining Co., N.L.	Hutchison, Hund. of	800	0	0	—		
Utica Copper Mining Co. N.L.	Burra	208	12	7	—		
Victoria Hill Amalgamated Gold Mining Syn.	Barossa, Hundred of	38	12	6	—		
Victoria Tower Mining Co., N.L.	Mannahill	345	18	9	90	0	0
Warrakimbo Propy. Copper Mining Synd.	Barndioota, Hundred of	220	16	2	—		
Warra Warra Propy. Copper Mines, N.L.	Farina	322	4	11	322	4	11
Watt's Gully Gold Mining Co.	Gumeracha	50	0	0	—		
Watt's Gully Reef Claims	Gumeracha	50	0	0	—		
Wolters, F. C., & Co	Echunga	25	0	0	—		
Wallaroo Central Mining Co., N.L.	Kadina	500	0	0	—		
Westward Ho Mine (Dr. H. Dixon)	Mannahill	1,000	0	0	—		
Wohler, H., & Co.	Myponga	20	0	0	—		
Wheal Turner Copper Mining Co., Ltd.	Prospecting on proposed line to Queensl'd Border	1,000	0	0	—		
Winnininnie Gold & Silver Propy. Co., N.L.	Winnininnie	86	3	6	—		
Woodside Boring and Mining Syndicate	Woodside	422	17	11	—		
Worturpa Exploration and Mining Co., Ltd.	Worturpa	800	0	0	—		
Yelta New Copper Mining Co., N.L.	Wallaroo	1,000	0	0	—		
Young Bullfinch Gold Mining Co., N.L.	Talunga, Hundred of	146	3	4	—		
Totals	—	62,554	16	6	7,659	16	4

ACCIDENTS IN MINES AND QUARRIES.

A gratifying feature of our mining operations in mines and quarries is the infrequency of serious accidents. Act No. 858 of 1904, bringing quarries in the same category as mines as regards the control of the Department of Mines has been effective in safeguarding the interests of quarry-men. The following table gives the number of accidents in mines and quarries during the last ten years:—

ACCIDENTS IN MINES AND QUARRIES.

Accidents in Mines.				Accidents in Quarries.			
Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.	Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.
1906	3	—	3	1906	1	1	—
1907	10	4	6	1907	3	1	2
1908	5	4	1	1908	—	—	—
1909	6	5	1	1909	1	1	—
1910	6	3	3	1910	2	1	1
1911	2	—	2	1911	—	—	—
1912	3	2	1	1912	2	—	2
1913	10	8	2	1913	—	—	—
1914	3	2	1	1914	3	2	1
1915	3	—	3	1915	3	2	1

ASSAYS AT SCHOOL OF MINES.

NUMBER OF ASSAYS MADE FOR PUBLIC PURPOSES AT THE SCHOOL OF MINES ASSAY DEPARTMENT DURING THE SIX MONTHS ENDED DECEMBER 31ST, 1915.

	1915.					
	July.	August.	Sept.	October.	Nov.	Dec.
Department of Mines	36	124	108	130	64	58
Public assays.....	144	131	80	61	106	78
Totals.....	180	255	188	191	170	136

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Return Showing, so far as can be ascertained, the Quantity and Value of Metals and Minerals Produced in the State of South Australia Annually since 1840.

Year.	Gold. Quantity.	Gold. Value.	Silver. Quantity.	Silver. Value.	Silver Lead Ore. Quantity.	Silver Lead Ore. Value.	Copper. Quantity.	Copper. Value.	Copper Ore and Regulus. Quantity.	Copper Ore and Regulus. Value.	Lead. Quantity.	Lead. Value.	Manganese Ore. Quantity.	Manganese Ore. Value.	Bismuth Ore. Quantity.	Bismuth Ore. Value.	Ironstone Flux. Quantity.	Ironstone Flux. Value.	Limestone Flux. Quantity.	Limestone Flux. Value.	Phosphate Rock. Quantity.	Phosphate Rock. Value.	Crude Salt. Quantity.	Crude Salt. Va	Other Metals and Minerals. Value.	Total Value.	Year.
	Ozs.	£	Ozs.	£	Tons.	£	Cwts.	£	Tons.	£	Cwts.	£	Tons.	£	Cwts.	£	Tons.	£	Tons.	£	Tons.	£	Tons.	£	£	£	
1840 ..			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	nil	1840
1841 ..			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	390	390	1841
1842 ..			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	nil	1842
1843 ..			—	—	18	104	—	—	1¼	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	127	1843
1844 ..			—	—	203	2,427	—	—	277	4,009	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6,436	1844
1845 ..			—	—	85	871	—	—	851½	12,613	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13,454	1845
1846 ..			—	—	147	1,487	—	—	6,462	140,794	17	20	—	—	—	—	—	—	—	—	—	—	—	—	—	142,251	1846
1847 ..			—	—	145	2,104	—	—	9,162	171,883	219	203	—	—	—	—	—	—	—	—	—	—	—	—	—	174,190	1847
1848 ..			—	—	682	10,452	73	215	16,323	310,172	130	104	—	—	—	—	—	—	—	—	—	—	—	—	—	320,943	1848
1849 ..			—	—	259	2,877	8,676	33,812	10,000	182,829	29	29	—	—	—	—	—	—	—	—	—	—	—	—	—	219,547	1849
1850 ..			—	—	385	2,941	44,595	174,574	8,992	187,556	615	393	—	—	—	—	—	—	—	—	—	—	—	—	—	365,464	1850
1851 ..			—	—	181	1,592	50,774	195,545	5,180	113,379	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	310,516	1851
1852 ..			—	—	—	—	39,187	161,847	11,714	212,931	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	374,778	1852
1853 ..			—	—	28	361	24,303	113,235	3,767	63,112	18	36	—	—	—	—	—	—	—	—	—	—	—	—	—	176,744	1853
1854 ..			—	—	22	425	8,119	35,312	3,279	59,094	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	94,831	1854
1855 ..			—	—	144	3,650	12,255	67,383	4,102	84,444	16	80	—	—	—	—	—	—	—	—	—	—	—	—	—	155,557	1855
1856 ..	Estimated value of production to July 31st, 1871, vide Gazette August 10th, 1871—	550,000	—	—	35	377	44,980	248,460	9,539	159,205	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	408,042	1856
1857 ..			—	—	1,422	23,855	56,893	290,739	8,115	144,245	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	458,839	1857
1858 ..			—	—	853	14,200	47,796	250,042	6,851	109,040	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	373,282	1858
1859 ..			—	—	262	8,068	56,745	289,841	7,447	107,399	1,261	5,710	—	—	—	—	—	—	—	—	—	—	—	—	—	411,018	1859
1860 ..			—	—	[illegible]	2,480	65,429	331,775	7,435	104,007	1,824	8,275	—	—	—	—	—	—	—	—	—	—	—	—	—	446,537	1860
1861 ..			—	—	15	300	61,047	294,572	8,207	152,874	1,250	4,426	—	—	—	—	—	—	—	—	—	—	—	—	—	452,172	1861
1862 ..			—	—	97	2,266	85,872	400,591	6,634	143,781	426	981	—	—	—	—	—	—	—	—	—	—	—	—	—	547,619	1862
1863 ..			—	—	451	9,007	96,039	447,944	5,382	84,917	271	525	—	—	—	—	—	—	—	—	—	—	—	—	—	542,393	1863
1864 ..			—	—	567	13,107	134,055	637,791	4,597	40,605	63	121	—	—	—	—	—	—	—	—	—	—	—	—	—	691,624	1864
1865 ..			—	—	86	1,507	100,196	433,795	16,176	184,677	82	133	—	—	—	—	—	—	—	—	—	—	—	—	—	620,112	1865
1866 ..			—	—	648	11,318	129,272	584,509	16,824	225,683	1,351	2,991	—	—	—	—	—	—	—	—	—	—	—	—	—	824,501	1866
1867 ..			—	—	212	3,358	156,863	627,384	11,455	113,969	3,391	5,464	—	—	384	2,061	—	—	—	—	—	—	—	—	—	732,231	1867
1868 ..			—	—	76	1,245	104,227	400,691	20,735	207,732	3,049	5,670	—	—	500	1,045	—	—	—	—	—	—	—	—	—	616,383	1868
1869 ..			—	—	24	296	92,788	371,566	26,835	250,259	2,936	4,471	—	—	42	500	—	—	—	—	—	—	—	—	—	[illegible]	1869
1870 ..			—	—	8	21	109,421	394,919	20,886	173,861	2,564	4,089	—	—	73	1,130	—	—	—	—	—	—	—	—	—	[illegible]	1870
1871 ..			—	—	—	—	127,911	518,080	20,127	119,903	3,381	5,497	—	—	223	4,720	—	—	—	—	—	—	—	—	—	*550,000 648,200	1871
1872 ..	—	—	—	—	61	2,324	149,050	680,714	26,964	122,020	—	—	—	—	22	1,168	—	—	—	—	—	—	—	—	—	806,226	1872
1873 ..	76	203	—	—	—	—	141,744	635,131	27,382	133,371	14	20	—	—	9	1,775	—	—	—	—	—	—	—	—	—	770,590	1873
1874 ..	1,111	4,175	—	—	24	332	132,587	557,306	22,854	136,530	—	—	—	—	29	1,960	—	—	—	—	—	—	—	—	—	700,303	1874
1875 ..	1,802	7,034	—	—	132	66	136,835	578,065	26,436	175,101	—	—	—	—	100	2,120	—	—	—	—	—	—	—	—	—	762,386	1875
1876 ..	2,501	9,888	—	—	17	215	109,269	427,403	22,682	164,597	11	14	—	—	20	200	—	—	—	—	—	—	—	—	—	602,317	1876
1877 ..	—	—	—	—	6	120	102,871	397,602	18,532	165,408	371	295	—	—	—	—	—	—	—	—	—	—	—	—	—	563,425	1877
1878 ..	324	1,225	—	—	—	—	71,866	252,206	17,046	156,318	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	409,749	1878
1879 ..	20	90	—	—	—	—	67,370	217,186	13,759	135,603	60	90	—	—	—	—	—	—	—	—	—	—	—	—	—	352,969	1879
1880 ..	—	—	—	—	—	—	66,108	233,374	14,656	113,864	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	347,238	1880
1881 ..	220	880	—	—	90	1,182	76,485	263,370	21,648	155,126	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	420,558	1881
1882 ..	764	3,080	—	—	82	2,111	72,955	259,884	25,897	195,686	—	—	131	664	—	—	—	—	—	—	—	—	—	—	—	461,425	1882
1883 ..	2,671	10,554	—	—	907	13,757	67,975	234,780	18,687	140,545	—	—	333	2,079	—	—	—	—	—	—	—	—	—	—	—	401,715	1883
1884 ..	3,970	15,469	—	—	886	5,898	91,441	287,753	23,968	181,477	—	—	59	236	—	—	—	—	—	—	—	—	—	—	—	490,833	1884
1885 ..	4,692	18,295	—	—	37	1,496	70,352	194,090	18,639	128,893	152	137	—	893	—	—	—	—	—	—	—	—	—	—	—	343,804	1885
1886 ..	8,825	32,535	—	—	34	602	72,710	172,330	14,782	58,536	28	183	1,550	10,895	—	—	—	—	—	—	—	—	—	—	—	275,083	1886
1887 ..	19,082	72,003	—	—	120	1,800	77,490	186,624	12,731	54,244	270	123	1,452	5,144	—	—	—	—	—	—	—	—	—	—	—	319,938	1887
1888 ..	8,728	34,205	1,929	372	171	2,550	63,310	252,627	13,055	74,755	2,780	1,973	1,021	3,507	—	—	—	—	—	—	—	—	—	—	—	369,989	1888
1889 ..	10,124	37,305	2,700	490	327	2,332	80,172	212,033	18,056	87,694	5,505	2,942	1,596	5,107	—	—	—	—	—	—	—	—	—	—	—	348,803	1889
1890 ..	5,184	20,808	—	—	528	8,452	59,237	155,417	15,380	71,575	—	—	2,764	7,028	—	—	—	—	—	—	—	—	—	—	370	263,645	1890
1891 ..	6,904	27,380	—	—	128	1,787	71,033	182,142	13,035	53,175	—	—	847	1,725	—	—	—	—	—	—	—	—	—	—	792	267,001	1891
1892 ..	6,569	26,097	—	—	74	521	53,074	132,040	10,596	43,485	580	334	704	1,526	—	—	—	—	—	—	—	—	—	—	48	204,051	1892
1893 ..	3,262	12,561	—	—	34	420	86,393	208,967	1,259	5,808	407	185	2,428	6,359	—	—	—	—	—	—	—	—	—	—	190	234,490	1893
1894 ..	8,904	33,401	—	—	—	—	98,888	208,639	309	1,963	74	34	174	517	—	—	—	—	—	—	—	—	—	—	2,961	247,515	1894
1895 ..	7,473	26,060	—	—	2	11	103,352	226,494	212	1,607	84	39	48	146	—	—	—	—	—	—	—	—	—	—	723	255,080	1895
1896 ..	4,031	14,350	—	—	—	—	92,069	219,052	348	3,150	987	707	—	—	—	—	—	—	—	—	—	—	—	—	598	237,857	1896
1897 ..	10,322	39,020	—	—	356	1,522	94,096	238,277	545	4,640	1,631	1,146	—	—	—	—	—	—	—	—	—	—	—	—	1,346	285,951	1897
1898 ..	2,798	10,676	—	—	188	950	95,414	244,865	536	3,992	6,316	3,806	—	—	—	—	—	—	—	—	—	—	—	—	560	264,849	1898
1899 ..	3,893	15,582	—	—	—	—	109,912	406,208	2,892	24,682	7,282	3,782	—	—	—	—	—	—	—	—	—	—	—	—	1,357	451,611	1899
1900 ..	3,721	14,494	—	—	—	17,526	97,727	371,920	2,367	22,526	7,650	4,382	—	—	—	—	—	—	—	—	—	—	—	—	411	431,259	1900
1901 ..	4,918	16,613	—	—	1,410	11,357	134,719	468,606	1,866	23,011	1,360	722	132	330	—	—	—	—	—	—	—	—	—	—	1,839	522,478	1901
1902 ..	7,231	24,878	—	—	2,680	10,740	136,937	388,162	2,579	42,550	43,507	22,303	18	62	—	—	—	—	—	—	—	—	—	—	680	498,375	1902
1903 ..	8,650	28,650	7,086	804	211	1,267	129,812	417,116	7,069	54,923	14,408	8,799	10	10	—	—	84,932	46,712	—	—	1,000	1,000	40,000	12,000	81	571,371	1903
1904 ..	17,897	76,025	—	—	—	—	125,560	382,356	3,051	24,597	—	—	—	—	—	—	46,687	27,091	43,440	6,516	3,000	3,000	40,000	12,000	198	531,783	1904
1905 ..	10,083	45,853	—	—	—	—	130,959	426,511	2,563	28,434	1,040	369	—	—	—	—	84,483	48,577	44,498	4,791	5,000	5,000	32,500	13,000	1,261	573,796	1905
1906 ..	8,037	27,000	801	104	—	—	164,160	718,609	—	—	1,000	550	—	—	—	—	75,226	33,852	31,940	4,791	5,850	5,850	55,000	27,500	2,209	820,465	1906
1907 ..	5,609	20,540	5,845	780	1,000	11,000	158,620	690,000	—	—	—	—	—	—	—	—	84,600	38,100	31,000	5,800	8,000	8,000	75,000	37,500	2,500	814,220	1907
1908 ..	2,908	12,300	—	—	900	9,000	112,554	338,000	—	—	—	—	—	—	—	—	88,000	39,600	29,500	6,000	11,000	11,000	75,000	37,500	4,500	[illegible]	1908
1909 ..	7,111	30,206	1,660	167	70	416	113,940	334,584	—	4,003	140	90	—	—	—	—	16,120	8,296	13,765	2,464	3,772	3,697	51,407	25,594	3,873	413,390	1909
1910 ..	6,603	28,000	6,250	625	25	22	102,040	306,120	—	a9,350	400	260	—	—	—	—	46,200*	21,945	18,600	3,720	5,200	5,200	54,000	27,000	g13,600	415,842	1910
1911 ..	3,537	15,000	1,400	140	—	—	118,440	332,500	—	b11,103	—	—	—	—	—	—	42,300	26,400	28,700	7,175	5,800	5,800	65,000	40,600	h11,319	[illegible]	1911
1912 ..	6,592	28,000	2,700	326	—	—	125,900	461,500	—	c10,192	—	—	—	—	—	—	42,200	26,375	50,600	12,500	6,100	6,100	64,300	40,187	i10,490	595,670	1912
1913 ..	6,556	27,800	2,660	300	153	1,100	143,222	488,986	—	d8,308	—	—	—	—	—	—	60,658	37,911	44,300	11,075	5,950	6,545	65,000	48,750	j11,851	642,626	1913
1914 ..	6,258	26,681	3,006	314	18	215	137,614	417,487	—	e8,910	—	—	—	—	—	—	42,622	37,137	54,054	16,892	6,083	6,691	65,000	48,750	k37,378	600,355	1914
1915 ..	6,081	25,830	2,462	277	59	625	154,506	561,247	—	f13,490	—	—	250	563	—	—	237,375	264,612	71,723	22,413	4,614	5,536	64,000	80,000	l27,292	1,001,885	1915
Totals.	†236,942	1,470,736	38,499	4,699	17,233	241,357	6,258,284	22,673,905	690,737	6,720,240	118,950	102,503	13,517	46,795	1,402	16,679	951,403	656,608	462,220	104,137	71,369	73,419	746,207	450,381	138,817	£32,700,276	

		£		£
a1910	Bluestone	5,980	Sulphuric acid	3,370
b1911	Bluestone	4,163	Sulphuric acid	6,940
c1912	Bluestone	2,550	Sulphuric acid	7,642
d1913	Bluestone, 13 tons	325	Sulphuric acid, 5,602 tons	7,983
e1914	Sulphuric acid, 5,940 tons	8,910		
f1915	Bluestone, 2¾ tons	69	Sulphuric acid, 5,965 tons	13,421

		£		£
g1910	Including gypsum	9,000	Pyrites	3,270
h1911	Including gypsum	7,275	Pyrites	2,580
i1912	Including gypsum	9,000		
j1913	Including gypsum, 7,150 tons	5,362	Radium and uranium ore	3,620

		£
k1914	Including gypsum, 16,276 tons	12,207
	Including kaolin, 10,239 tons	16,382
	Including radium and radio-active material	5,215

		£
l1915	Including gypsum, 19,900 tons	17,413
	Including flint pebbles, 385 tons	1,025
	Including kaolin, 1,209 tons	1,934
	Including fire clay, 7,165 tons	5,374

* Estimated value of production to July 31st, 1871, *vide Gazette*, August 10th, 1871.

† Incomplete.

To face page 32

DECENNIAL RETURN SHOWING, SO FAR AS CAN BE ASCERTAINED OUTPUT AND VALUE OF VARIOUS METALS AND MINERALS PRODUCED IN SOUTH AUSTRALIA.

Year.	Gold.		Silver.		Silver Lead Ore.		Copper.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ounces.	£	Ounces.	£	Tons.	£	Cwts.	£
1906	8,037	27,000	801	104	—	—	164,160	718,609
1907	5,609	20,540	5,845	780	1,000	11.000	158,620	690,000
1908	2,908	12,300	—	—	900	9,000	112,554	338,000
1909	7,111	30,206	1,660	167	70	416	113,940	334,584
1910	6,603	28,000	6,250	625	25	22	102,040	306,120
1911	3,537	15,000	1,400	140	—	—	118,440	332,500
1912	6,592	28,000	2,700	326	—	—	125,900	461,500
1913	6,556	27,800	2,650	300	153	1,100	143,222	488,986
1914	6,258	26,581	3,006	314	18	215	137,614	417,487
1915	6,081	25,830	2,462	277	59	625	154,506	561,247
Totals....	—	241,257	—	3,033	—	22,378	—	4,649,033

Year.	Copper Ore and Regulus.		Lead.		Ironstone Flux.		Limestone Flux.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Cwts.	£	Tons.	£	Tons.	£
1906	—	—	1,000	550	75,226	33,852	31,940	4,791
1907	—	—	—	—	84,600	38,100	31,100	5,800
1908	—	—	—	—	88,000	39,600	29,500	6,000
1909	1,230	4,003	140	90	16,120	8,296	13,765	2,464
1910	—	*9,350	400	260	46,200	21,945	18,600	3,720
1911	—	*11,103	—	—	42,300	26,400	28,700	7,175
1912	—	*10,192	—	—	42,200	26,375	50,600	12,500
1913	—	*8,308	—	—	60,658	37,911	44,300	11,075
1914	—	*8,910	—	—	42,622	37,137	54,054	16,892
1915	—	*13,490	—	—	237,375	264,612	71,723	22,413
Totals	—	65,356	—	900	—	534,228	—	92,830

Year.	Phosphate Rock.		Crude Salt.		Other Metals and Minerals.	Total Value.
	Quantity.	Value.	Quantity.	Value.	Value.	
	Tons.	£	Tons.	£	£	£
1906.....	5,850	5,850	55,000	27,500	2,209	820,465
1907.....	8,000	8,000	75,000	37,500	2,500	814,220
1908.....	11,000	11,000	75,000	37,500	4,500	457,900
1909.....	3,772	3,697	51,407	25,594	3,873	413,390
1910.....	5,200	5,200	54,000	27,000	†13,600	415,842
1911.....	5,800	5,800	65,000	40,600	†11,319	450,037
1912.....	6,100	6,100	64,300	40,187	†10,490	595,670
1913.....	5,950	6,545	65,000	48,750	†11,851	642,626
1914..... ..	6,083	6,691	65,000	48,750	†37,378	600,355
1915.....	4,614	5,536	64,000	80,000	†27,855	1,001,885
Totals	—	64,419	—	413,381	125,575	6,212,390

* Bluestone, £5,980; Sulphuric Acid, £3,370.
" £4,163 " £6,940.
" £2,550 " £7,642.
" £325 " £7,983.
" — " £8,910.
" £69 " £13,421.

† Including Gypsum, £9,000; Pyrites, £3,270.
" £7,275; " £2,580.
" £9,000.
" £5,362; Radium and Radio-Active Material, £3,620.
" £12,207; Kaolin, £16,382. Radium and Radio-Active Material, £5,215.
" £17,413; Kaolin, £1,934; Fireclay, £5,374; Barytes, £1,320.

REPORTS FORMING ADDENDA TO THE RECORD OF MINES.

REPORTS

BY

The Government Geologist (L. Keith Ward, B.A., B.E.).

NOTES ON THE TARCOOLA GOLDFIELD.

The following notes and suggestions are based upon the observations made during a visit made by the writer to Tarcoola with the primary object of investigating the possibilities of securing an improved supply of water for the Government Battery and Cyanide Works.

The total tonnage of ore won from the Tarcoola Mines and crushed prior to the end of June, 1915, was 37,020 tons 12cwts., from which 52,480ozs. 14dwts. 8grs. of bullion, having a value of £163,038 18s. 5d. have been recovered.

Of this total the Government Battery has crushed 6,091 tons 12cwts. for 8,895ozs. 14dwts. 8grs., worth £31,373 18s. 5d., since it was put into commission in November, 1901. The remainder—much the larger portion of the ore crushed—has been treated by the battery of the Tarcoola Blocks Mine, which was already at work when the Government battery started crushing for the public.

The following table, completed to October 22nd, 1915, shows the output from the principal mines in the Tarcoola district:—

ORE CRUSHED BY THE TARCOOLA BLOCKS BATTERY.

Name of Mine.	Tonnage Treated.	Bullion Recovered.	Value of Bullion.
	Tons cwts.	Ozs. dwts. grs.	£ s. d.
Tarcoola Blocks (including a relatively small tonnage from the Tarcoola Enterprise lease)	30,929 0	43,585 0 0	131,665 0 0

ORE CRUSHED BY THE GOVERNMENT BATTERY.

Name of Mine.	Tonnage Treated.	Bullion Recovered.	Value of Bullion.
	Tons cwts.	Ozs. dwts. grs.	£ s. d.
Tarcoola Blocks	302 5	852 5 14	1,942 13 10
Tarcoola Enterprise	214 7	302 9 4	1,022 10 4
Tarcoola Perseverance	1,376 10	2,575 1 13	9,679 14 5
Day Dawn United	952 13	1,538 15 19	5,148 16 7
Curdnatta	668 6	872 15 11	3,219 14 10
Royal George	513 0	376 14 3	1,392 1 11
Government Mine	434 19	1,006 17 10	3,319 18 4
Morning Star	240 10	505 14 19	1,723 1 7
Lake Labyrinth	64 10	56 10 11	207 2 3
Eclipse	38 10	32 9 2	115 3 11

The figures given in this table indicate a high average grade of ore crushed. It may appear surprising that the output from the smaller mines of the field has not been larger when the crushings alone are taken into consideration. The variable size of the ore-shoots, the hardness of the country rock, and the irregularity of disposition of the shoots in some of the mines have been factors contributing towards the retarding of development.

Several of the smaller mines have been worked intermittently with varying success, and from time to time new discoveries have been made in various parts of the field, which, as contributors to the output of the district, have taken the place of those mines that have been temporarily abandoned.

It cannot be said that the remoteness of the position of the Tarcoola field has greatly hampered the development of many of the mines—particularly those which have been working on a restricted scale with a small equipment—for the reason that the Government has always offered facilities for crushing ore at low rates.

The Tarcoola Blocks Company, which was working on a much larger scale with its own battery, has been less advantageously placed. Before the construction of the Transcontinental Railway line the transport charges to Tarcoola were about £10 per ton on the average. In a few cases the costs were reduced to £6, and in other cases they rose as high as £12 per ton. Materials were brought to the field by horse, bullock, and camel wagons, or were packed on camels. Different transport routes were followed, namely, from Murat Bay, Port Augusta, and Coward Springs.

These disabilities of transport are not yet entirely removed, although the rails on the Transcontinental route are already laid beyond Tarcoola. The necessity for giving preference to the materials of construction destined for the head of the line still causes a certain amount of delay in the carriage of stores and materials for the mines. When the line is open for regular traffic general conditions for both the larger mines and the mining population will be greatly improved.

The part that has been played by the Government battery and cyanide works in the development of the Tarcoola field has always been an important one. Since crushing at the Tarcoola Blocks battery was discontinued the whole output of the district has been treated by the Government plant, and it is fortunate that this plant, which was originally erected to enable prospectors to have trial parcels of ore crushed at a moderate rate, has been able to cope with the production of the field. The clear proof that the Government plant has coped with the total output within recent years is given by the fact that at the time of the writer's visit to the field there were only 300 tons of ore broken and available for crushing.

The Government plant has been located in a most favorable spot for securing supplies of water suitable for boiler purposes. The difficulty of obtaining water for raising steam has always been a serious one, and the Government battery has been much more advantageously placed than the battery at the Tarcoola Blocks Mine for getting boiler water. At the same time it is recognised that a larger supply of water is needed for the Government plant for use in the battery and for cyaniding. The necessity for a larger supply is accentuated by the high proportion of slimes in much of the ore brought to the battery. A filter plant, now in course of erection, will assist materially in reducing the losses of water and in increasing the output of the battery. In addition, approval has been given for sinking a well at a site so selected as to afford the best chance of obtaining further supplies of water for crushing and cyaniding. This well being successful, the capacity of the plant will be materially increased.

The mining operations that were being carried out in the principal mines at the time of the writer's visit to the district were almost wholly restricted to the stoping of the known ore-shoots at shallow levels. Some underground prospecting has recently been carried out on the Royal George Mine, and prospecting drives were in progress on the Tarcoola Blocks Mine (in search of any possible extension of the Tarcoola Perseverance lode), and on the Day Dawn Mine. The Tarcoola Blocks

Mine was being unwatered in order that work might be resumed at a depth, and the work of stoping in several shallow open cuts was in progress. Ore of good grade was being broken from the stope above the 110ft. level in the Tarcoola Perseverance Mine, but no development work was being carried out on this property at the time when it was visited. The systematic exploration of the Perseverance lode in depth can be confidently recommended, and it is necessary to make steady progress with this work if the productivity of the mine is to be maintained. The deepest workings on the Day Dawn main lode extend beneath the shoot of ore from which the production of the mine has been maintained, and some prospecting winzes should be sunk from the 70ft. level to try and locate another shoot of ore.

Quite recently there has been a revival of prospecting at Tarcoola, and the discovery of a valuable shoot of ore near the hospital reserve has had a stimulating effect. The fact that this recent find has been made in a spot over which very many prospectors have repeatedly passed, and that earlier work on the extension of the lode itself actually exposed ore of which the value remained so long unrecognised, serve to show that much work yet remains to be done before the possibilities of the field can be regarded as exhausted.

The following detailed description of the recent find is presented, the occurrence not having been previously mentioned in any report by an officer of the Department of Mines:—

The Gallipoli Mine, owned by Messrs. C. Davies and R. Dressley, is situated in section 786, immediately to the east of the hospital reserve at Tarcoola. The new discovery was made in the vicinity of some very old workings which had actually exposed some of the auriferous vein quartz. The two prospectors found auriferous stone on the surface near an old pit, and proved the presence of gold in the stone thrown out of the pit itself. They then started a shaft in the western or hanging wall of the reef and had reached a depth of 30ft. when a more promising result was obtained by dollying stone from the outcrop of the reef at a point 260ft. to the northward of the lode. Work at the shaft was suspended, and the lode was followed down to a depth of 18ft. A little stoping was done between this depth and the surface, and about 500 cub. ft. of ore were removed. The lode varies in width from 1ft. to 3ft. in the various portions exposed in this opening, and the average width is over 2ft. The lode dips to the westward at an angle of 80 degrees, and the walls are well defined. The footwall is fairly regular, but a small break is visible at one point in the main opening. The ore consists of quartz containing a little iron pyrites and a few cavities, some of which are filled with limonite. The gold present in the quartz is both coarse and fine, and some rich specimens have been obtained.

A shaft has been started at a point 25ft. to the northward of the stope referred to above, but the lode at a depth of 8ft. has been proved to lie on the western side of the shaft, and the shaft if continued vertically will probably be wholly in the footwall of the lode. It would appear preferable to discontinue sinking at this place and to put down a vertical shaft at a point distant a few feet to the westward.

A little surface prospecting has been done along the course of the reef between the old pit sunk many years ago and the new excavation from which the ore has been recently won, and this work has proved the presence of auriferous stone very close to the surface. The work already carried out is not sufficient to determine whether the ore-shoot is quite continuous over the whole distance of 300ft. over which auriferous quartz has been proved. The several points at which gold has been found are not strictly collinear, but they are all situated within a few feet of a line having a bearing of N. 25° E.

The lode occurs in granite country, and is near the southern boundary of the granite. Slate and quartzite outcrop at the southern boundary of the section, and the granite is intrusive into these rocks. The lode has not yet been traced as far as the contact, which is almost on the southern boundary of the section.

The owners of the property have made a most promising discovery, which merits systematic development. As far as can now be ascertained the lode appears likely to offer a material contribution to the output from Tarcoola. The small variations in the course of the outcrop should be noted carefully, with a view to guiding the work of underground development. It is advisable to make a series of panning tests of the country rock immediately adjacent to the lode, as it is possible that the gold may be found to have migrated into the walls, especially at shallow levels, where much limonite is present.

A crushing has already been made at the Tarcoola Government battery, with most encouraging returns. The parcel consisted of 42 tons of ore, mostly won from the newly discovered part of the lode, and containing also a few tons from the old pit that was abandoned many years ago. The total return from the 42 tons was 144ozs. 18dwts. 18grs. of bullion, worth £501 16s. 11d. The battery treatment showed a high recovery, the tailings containing only 1dwt. 15grs. per ton.

REPORTS

BY

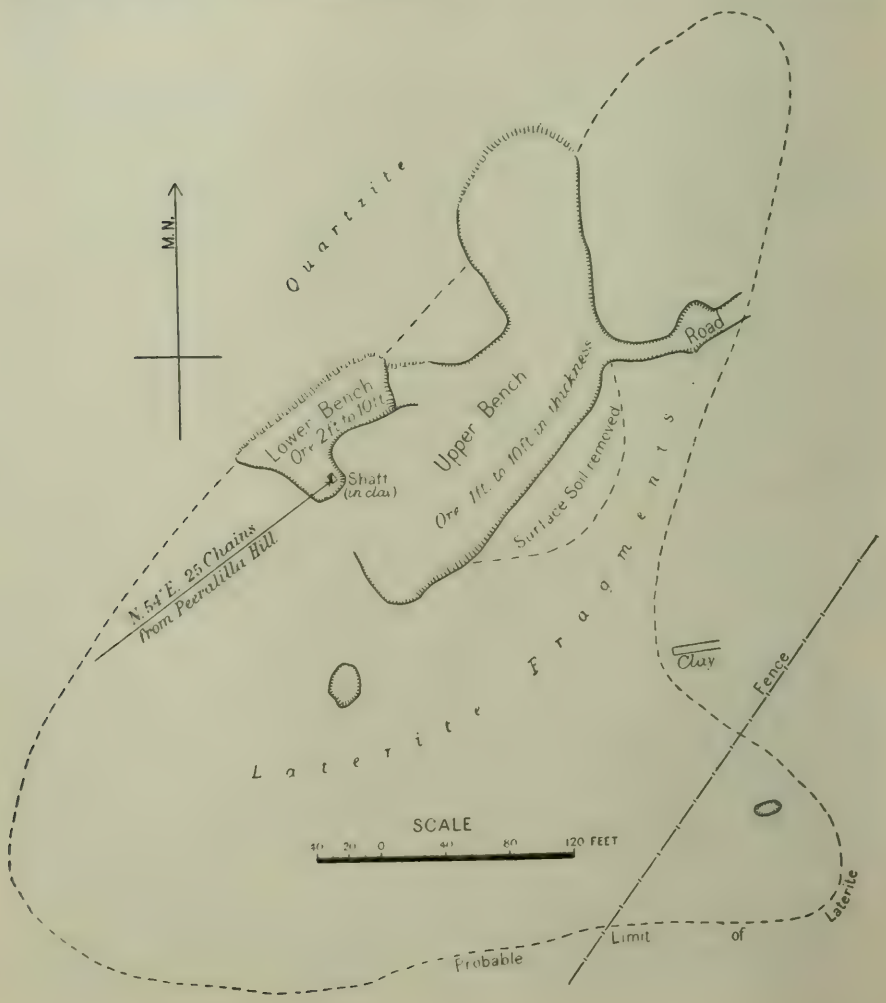
The Assistant Government Geologist (R. Lockhart Jack, B.E., F.G.S.).

PEERALILLA IRON DEPOSIT.

(*Vide* Record, page 322.)

The deposit is situated 25 chains in a N.E. direction from the trig-cairn, and is at an elevation of about 1,000ft. above sea level.

To the N.W. of the workings the western slope of the hill is rugged owing to the development of steeply-tilted quartzite, but the site of the workings on the crest of the ridge and the slopes to the S.E. exhibit the rounded smooth topography due to the presence of argillaceous rocks.



The deposit consists of dark-brown, brown and yellow limonite, varying in texture from earthy to massive material, and has been removed over an area of two-thirds of an acre. The upper bench of the workings shows the ore to have been removed to a depth of 1ft. to 8ft. An average depth of probably 3ft. has been so removed. An indeterminate quantity of ore is still left underfoot. At a slightly lower level a smaller bench has been taken out, and the ore left ranges from 2ft. to 10ft. in thickness.

A sample chipped from the face of this bench, and which may be regarded as fairly typical of the area worked, had the following composition :—

Water at 100° C.	3·40
Water above 100° C.	11·90
Silica (SiO_2)	6·62
Alumina (Al_2O_3)	6·44
Ferric oxide (Fe_2O_3)	70·14
Ferrous oxide (FeO)	Nil
Magnesia (MgO)	·17
Manganous oxide (MnO)	·82
Phosphoric anhydride (P_2O_5)	·36
Titanic dioxide (TiO_2)	·08
Sulphur (S)	·21
	100·14
Total iron (Fe)	49·10
Phosphorus	·15

A shaft has been sunk in the floor of this bench to a depth of 20ft. and a crosscut to the S.E. is visible.

The shaft is sunk in decomposed argillaceous rocks. This prospecting was evidently done owing to a misconception of the nature of the ore body, which is purely a superficial deposit of lateritic habit.

From the area worked and the depth as shown by the sides of the excavation, it is probable that from 8,000 tons to 10,000 tons have been removed. This material was shipped at Port Victor for flux in the lead smelters.

The extent of the deposit still remaining cannot be exactly determined, as the laterite is covered by a few inches of soil, but it is improbable that its maximum extent exceeds four acres. As it is probable that the best and deepest known portion of the deposit was worked, and as some ore is still left in the bottom of the upper bench, it might be reasonable to assume that the area unworked would yield about the same tonnage per acre as that already worked. This would indicate a possible tonnage of 45,000 tons. (16-6-15.)

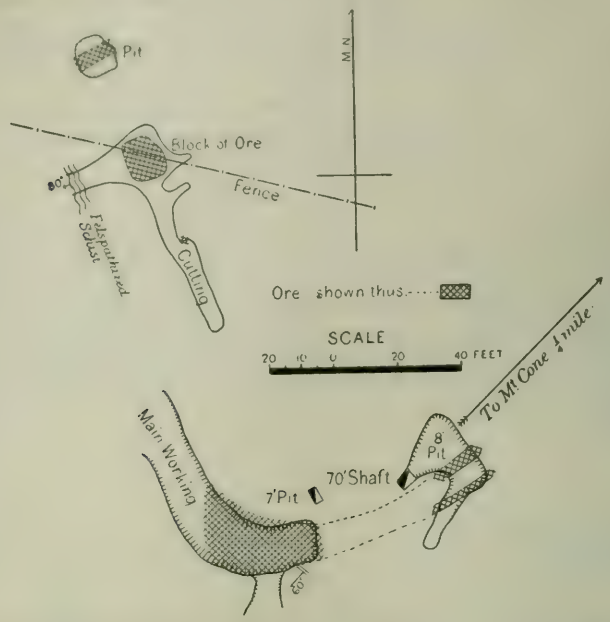
MOUNT JAGGED IRON MINE.

(*Vide* Record, page 322.)

The workings are situated on section 52, hundred of Encounter Bay, and are approximately a quarter of a mile S.W. of Mount Cone.

The country rock is felspathised schist in which occur bunches of iron ore. Four main openings have been made, of which the relative positions are shown on the accompanying sketch. The easternmost is 8ft. in depth, and exposes a width of 12ft. of quartz and ironstone. Of this half is iron ore carrying a small proportion of quartz. The lode here appears to strike N. 55° E., and to be nearly vertical. A shaft has been sunk in this pit, immediately to the N. of the lode, to a depth of about 70ft., and the upper portion at least is in country. Thirty-five feet W.S.W.

the main working, an open cut about 60ft. long by 15ft. deep, with its axis N.W.-S.E., is seen. Possibly the ore is continuous through the standing ground between the two cuttings.



The eastern face of the main working exposes over 7ft. of ore. For 30ft. to the W. the ore body is seen in the walls of the open cut, and has a width of 12ft. Some 20ft. N. of the point where it is last seen in the S.W. wall of the opencut, and on the opposite side of the cutting, it appears to be tapering off, and the ore carries an admixture of quartz, and is consequently of lower grade. From here to the mouth of the open cut no ore is visible. The ore broken in this working is as a whole free from gangue, and a sample, broken from a heap of about 100 tons that is stacked in the open cut, and that may be regarded as representative of the ore mined from this cutting, has the following composition :—

Water at 100° C.	Nil
Water above 100° C.	·34
Silicia (SiO_2)	·14
Alumina (Al_2O_3)	·25
Ferric oxide (Fe_2O_3)	87·85
Ferrous oxide (FeO)	6·09
Magnesia (MgO)	—
Manganous oxide (MnO)	·06
Phosphoric anhydride (P_2O_5)	Nil
Titanic dioxide (TiO_2)	5·20
Sulphur (S)	·04
	99·97
Total iron (Fe)	66·23

A little northward of the main working a trench has been cut in a N. 20° W. direction along the strike of the schist. A small bunch of ore is exposed at 30ft., and at 60ft. from the S. end a block of ore 15ft. x 10ft. has been cut round. This body, composed of haematite and ilmenite, with a small proportion of quartz, cannot be seen on the outer wall of the encircling trench.

Thirty feet N. 25° W. is a smaller pit in which a body of iron and a little quartz 4ft. to 5ft. thick, and apparently striking N.E. and S.W. A sample from this, taken as representative of the second grade ore, has the following composition :—

Water at 100° C.	·03
Water above 100° C.	·41
Silica (SiO_2)	2·10
Alumina (Al_2O_3)	1·42
Ferric oxide (Fe_2O_3)	86·51
Ferrous oxide (FeO)	4·88
Magnesia (MgO)	—
Manganous oxide (MnO)	·01
Phosphoric anhydride (P_2O_5)	Nil
Titanic dioxide (TiO_2)	4·60
Sulphur (S)	·06
	100·02
Total iron (Fe)	64·35

Some detrital iron ore is strewn about the surface in the vicinity of these workings, but no definite outcrops were seen other than those that had been worked, and it is difficult to correlate the bodies worked, with the exception of those in the two southern openings.

The presence of 4·9 per cent. of titanic oxide (2·99 per cent. of titanium) may be noted in view of the fact that " Under present furnace practice . . . the smelting of these ores is both difficult and expensive, and for that reason they are not accepted by furnaces, so that the deposits are practically worthless." *

" At present there is a prejudice, justifiable or not, against the use of ores carrying more than 1 per cent. of titanium." †

The same author points out that experiments in the direction of mixing titaniferous iron ores with titanium-free ores indicate a method for their utilisation, and also quotes results which show that there is a possibility of utilising such ores by direct smelting in an electric furnace.

In places the ore of Mount Jagged contains more or less quartz.

The mine was formerly worked and the ore smelted in a charcoal furnace, and at a later period some ironstone was carted to Port Victor and shipped for flux. From the extent of the open cuts the total quantity removed can hardly have exceeded 1,000 tons to 2,000 tons

The presence of titanium, which is regarded as detrimental in smelting, the small size of the deposit, and the fact that underground working would soon have to be resorted to, coupled with the cost of cartage, preclude the economic exploitation of this deposit in competition with larger or more favorably situated ore bodies in this State and elsewhere in Australia. (17-6-15.)

* Bull. 64, Bureau of Mines, U.S.A. " The Titaniferous Iron Ores in the United States." J. T. Singewald.

† Ibid.

REPORT ON TUNGSTEN DEPOSIT AT CALLAWONGA CREEK, HUNDRED OF WAITPINGA.

Under instruction from the Hon. the Minister of Mines the writer visited the tungsten-bearing deposit at Callawonga Creek, hundred of Waitpinga, on the 28th August, 1915.

The field is situated 18 miles by road from Normanville.

Six mineral claims, each of 40 acres, are marked out, and five men are on the field engaged on the claims and prospecting in the vicinity.

The greater portion of the group of claims lies on the left bank of Callawonga Creek, and includes some of that locality designated as "Gold Digging Swamp" on the hundred plan. The country is fairly hilly.

The rocks, as far as can be seen, consist of fine-grained quartzite, sandstone, and arenaceous slate. Mica schist appears to be present also, but was not seen *in situ*. The dip of the country rock, as exposed at the main workings on mineral claim 9802, is 20° to the S.W.

The surface is largely made up of clayey soils, with quartz debris and limonite gravel.

Gold has been worked on Callawonga Creek, and is reported to occur in small amounts in the surface soil of the hills and in the quartz lodes. However, a sample of quartz taken from the main shaft on the tungsten lode on assay proved to be barren of gold.

A large siliceous body, containing schorl and a little felspar, and striking E. 10 N., has been worked for gold to some extent at the spot marked "Gold Mine" on section 242, hundred of Waitpinga. A tailing dump on the bank of the creek marks the site of the mill, but no records of the result of crushing were obtained. The mine is probably that referred to as the "Bullaparatta" in the Record of Mines of South Australia, 1908.

Preparations were also made at one time for dredging in Callawonga Creek, but the plant was not erected.

The only deposits of tungsten ore *in situ* known at present are on mineral claim No. 9802, known as the "Queen Mary." Work is confined to this block and to general prospecting.

The main workings here consist of an open cut continuous along the lode, except for a block 10ft. long, over a distance of 120ft., and averaging 10ft. in depth. Two shafts of 23ft. and 12ft. have been sunk in this open cut, and some trenching has been done to the southward.

The lode consists of glassy quartz, with patches of kaolin and aggregates and seams of limonite. Felspar is visible, and mica is present in small amount, while schorl is relatively abundant. The lode is undoubtedly an extremely acidic facies of a pegmatite dyke, and contains ferberite (tungstate of iron) in irregularly distributed dabs and bunches. A sample of clean ferberite from this locality has been analysed by Mr. W. S. Chapman, and found to contain—

	Per Cent.
Water	1·26
Tungstic acid	71·35
Ferrous oxide	26·26
Manganese oxide	·17
Magnesia	·03
Silica	·24
Tin di-oxide	Nil.
	99·31

The lode varies in width from 2ft. to 6ft. as far as opened, the greatest thickness being in the bottom of the northern or main shaft. It has a general strike of S. 15° E., and underlies to the eastward about 1 in 10.

According to Mr. Munro, who first opened up the lode, 1½ tons of tungsten ore has been won from these workings prior to the present syndicate taking over the property, and a few bags of the mineral have been obtained since that date.

The following were the chief pockets found :—

(1) 13¾cwts. from the cutting above the site of the main shaft.
(2) 4cwts. from a bunch in the cutting about 30ft. N. of the S. shaft.
(3) Several large blocks, including one of 62lbs., from the S. shaft.

The balance of the ton and a half came from smaller bunches in the open cut and shafts, the lode material being picked over and dressed by hand.

A second open cut, on a quartz vein carrying pyrite, has been opened along the outcrop for a distance of 45ft. on a bearing of S. 30° E. from a point 115ft. S.S.W. from the S. shaft of the main workings, and two pockets, yielding 180lbs. and 3cwts. of tungsten ore, were obtained. Towards the S. end of this cutting the quartz is seen to occur in two vertical veins, each 12in. wide.

One hundred yards to the S.W. of this point an E. and W. vein of pyritic quartz has been opened up, and a few pounds weight of tungsten ore obtained.

The type of lode is such as to suggest persistence in depth, and as the distribution of the tunsten ore was determined at the time of formation, and the mineral ferberite is barely susceptible to modification by secondary enrichment the generally irregular distribution found in the workings already made may be expected to continue. It is impossible to say whether the proportion of tungsten to gangue will change, but driving on the lode may disclose other bunches, or an area in which the bunches are closer to one another. The shaft is making about 400galls. of water per day, but the provision of drains to keep surface waters out of the open cut should reduce this amount, and there should be no great difficulty in sinking to about 40ft.—the level of the creek bed—and driving on the lode at about this depth in search of a possible richer zone, a course that would be preferable to deeper sinking, until further knowledge is gained of the lode and its value. (15–9–15.)

REPORTS

BY

The Inspector of Mines (Mr. Henry Jones).

LOCALITY—MOUNT LOFTY RANGES.

THE PRINCE ALBERT COPPER MINE (*vide* Review No. 19).—Situated 14 miles N.E. from Adelaide, on section 332, hundred of Onkaparinga.

A fair amount of mining and prospecting work appears to have been done in the past on different parts of this property, but as there are no records of the nature and values of the ore bodies operated on the present company when they acquired the blocks had no alternative, therefore, but to clean out some of the old workings, so that the lodes could be examined prior to deciding as to the best course to adopt for further testing and developing the various ore channels.

The old mine vertical shaft, situated in a narrow gully between two high hills, has recently been cleaned out to a depth of 75ft. The old timber in the top portion of the shaft has been removed and new timber put in from the surface to a depth of 25ft. From that point down to the 70ft. level the country rock is hard calcareous bluestone, and does not appear to require timbering.

At the 70ft. level in the shaft a lode formation was intersected, bearing N.W. and S.E., dip S.W. at an angle of 35°. The lode matrix is chiefly quartz with iron pyrites, 3ft. 6in. wide, all the joints and faces in the quartz are strongly stained with copper carbonates, and in places small nodules and veins of malachite, azurite, and copper pyrites are showing in the matrix, but taken in bulk the lode at this level appears of rather low grade, but may improve as greater depth is attained. To further test this ore channel, considering that it has such a slight angle of dip, the best and much the cheapest plan to adopt is to follow the ore body down by sinking from present depth on the underlie, as any further vertical sinking would be going from the lode and much crosscutting would be required in hard country, but by adopting the underlie method of working the ore channel would be more thoroughly tested at much less expense.

At the bottom of the shaft a drive in the lode has been extended E. 24ft. At that point a fault occurred in the country, cutting off the ore. The fault is 10ft. wide with two defined vertical walls bearing N.E., the material between the walls is of soft and broken nature, the drive was continued partly N.E. and the latter portion E. in the disturbed zone for a distance of 36ft., making the total length of the drive 60ft. It appears quite possible that the displacement in the lode channel is an upthrow going E., as 18in. of quartz is showing in the eastern fault wall 9ft. above the floor of the drive, but it contains no copper ore at the point exposed.

On block 9346, about 500yds. N. from the shaft, a fair amount of mining work has been done on the eastern side of a hill, 80ft. above the gully and in the open cut along the outcrop. "Syd's Reef" has been exposed for a length of fully 40ft., bearing N.E. and S.W., dipping S.E. at an angle of 45°; this is a well defined lode formation and appears likely to continue to a great depth, the lode matrix consists mainly of ferruginous quartz with pyrites 24in. to 30in. wide, densely impregnated with copper pyrites. At one end of the open cut an underlie shaft has been started on the dip of the lode, and is now down 8ft. Sinking here should be continued, as the character of the formation exposed fully justifies the work of following the ore channel down to determine its width and value at greater depth.

Face p. 44]

Hummocky Point Jetty from Hummocky Hill.

[Photo by J. Jobson.

No. 1—Sample taken from all over the face of the underlie at a depth of 8ft. gave 4·2 per cent. copper.
No. 2.—Sample from face of underlie, width 2ft., gave 2·7 per cent. copper.
No. 3.—Sample from dump of 1 ton of picked ore on surface, 1oz. 2dwts. silver and 11·3 per cent. copper.
No. 4.—Bulk sample from the crude ore obtained in sinking, 3·1 per cent. copper.

Three samples taken of the formation exposed in the vertical shaft gave the following results:—

No. 5.—From 70ft. level, lode 2ft. wide, 1·5 per cent. copper.
No. 6—From 70ft. level, E. of fault, lode 20in. wide, nil.
No. 7.—From 70ft. level, picked ore, 1cwt. weight, 15·9 per cent. copper.

Two samples taken at the outcrop of a quartz lode on the N. side of the hill gave no values.

There are several other formations traversing these blocks containing copper ore, but as "Syd's" lode appears to be the most defined and consistent in values it would be best at present to concentrate the labor on the work of developing this lode by further sinking of the underlie shaft. (1–10–15.)

The Grunthal Copper Mine.—Situated about 17½ miles E. from Adelaide on section No. 3926, hundred of Onkaparinga.

The old main workings on this block are situated on a small watercourse plain close to the Adelaide and Melbourne railway line, and comprise five shafts sunk to various depths and connected by winze, sinking, driving, and stope workings down to the 56ft. level.

The whole of the shafts and underground workings are within an area of 4 chains E. and W. by 2 chains wide.

The main shaft (and most eastern one), 11ft. by 5ft. 2in. in the clear, strongly timbered with square sets and back laths, is down a total depth of 240ft. Small plats have been made at 60ft., 108ft., and 220ft. levels respectively, and some crosscutting and driving work done at each of these depths.

About nine weeks ago the present owner equipped the mine with two gear and belt pumps; one 6in., driven by petrol engine, 6 H.P., and one 8in. pump, driven by 8 H.P. oil engine. Both pumps worked satisfactorily, and the mine was unwatered down to the bottom in seven weeks' time. The water now making amounts to about 1,500galls. per hour. This quantity only requires the working of the 6in. pump, which can take all the water out easily by running at about three-quarters of its capacity.

220*ft. Level, Main Shaft.*—The S.E. drive is in a total distance from the plat of 80ft. At a point in this drive 16ft. from the shaft a drive has been extended in a S.W. direction for a distance of 75ft.; the first 10ft. of driving was in country rock, when a formation was intersected in which work has been done for about 4ft. westward and along the side of the drive for 10ft. and upwards at one place for 11ft., the material exposed here consists of quartz veins, calcspar, and slates containing specks and small seams of copper pyrites.

At a point 21ft. in the S.E. drive a crosscut has been extended in a N.E. direction for a distance of 15ft. In this a seam of quartz, 20in. wide, containing specks of copper sulphide is showing, bearing N.W. and S.E., dip N.E.

108*ft. Level, Main Shaft.*—From the plat at this level driving E. has been carried in a total distance of 35ft. At a point 25ft. in from the shaft a winze has been sunk from the bottom of the drive; it is now full of water and therefore could not be examined. Stacked near the top of the winze are several tons of lode material, said to have been obtained in sinking, this appeared very promising lode matrix, consisting mainly of quartz impregnated with copper pyrites.

Opposite the winze a drive has been extended S. for a distance of 54ft., the material disclosed in this consists of quartz and calcspar veins in clayslates and argillaceous sandstone with small bunches of copper sulphide showing for a width of 5ft. or 6ft. near the mouth of the drive. The drive W. from the shaft at this level is carried in a total distance of 30ft. At a point 6ft. in from the shaft a large formation is exposed with a well-defined hanging wall, bearing N. and S., dip E. Above the back of the drive some work has been done for 5ft. in the formation and for a length of about 8tt. by 4ft. wide. The matrix consists of quartz seams and calcspar containing sulphide ore. This formation and that intersected in the S.W. drive at 220ft. level are similar in appearance, and the indications tend strongly to show that they are one and the same ore channel.

No. 4 Shaft. 56ft. Level.— A considerable amount of driving and stoping work in various directions has been done at this depth, and the workings of the four shafts are connected by stopes and rises carried up in irregular channels and pipe-like deposits of ore. These shoots of ore, judging by the work done, were apparently of short length, but show a width worked of from 4ft. to 8ft. in places. The N. drive is in a total distance of 48ft. From that point a drive has been extended E. up to No. 1 or main shaft over the back of this drive. The main portion of the stope worked is opened up to No. 2 shaft, and shows that a large quantity of ore-bearing material was extracted from this part of the mine. At one point in the E. drive a winze has been sunk to a depth of 25ft. in ore-bearing material. E. of the winze near the main shaft a drive in country rock is in a total distance of 18ft.

Considering that the mining work enumerated was done 39 years ago, and that the mine during that period was full of water to within a few feet of the surface, most of the underground workings and main shaft are in a good state of preservation, and when the mud and other deposits have been cleaned out from the sides and faces of the different workings, much better facility will be given for locating the lines of demarcation of the ore channels, which would be of great assistance in determining on the best mode for future operations.

Thirteen samples were taken from various parts of the workings, which gave the following results:—

No. 1. For first 6ft. of formation, S.W. drive, 220ft. level, 1·4 per cent. copper.
No. 2. For second 6ft. of formation, S.W. drive, 220ft. level, 0·9 per cent. copper.
No. 3. From across drive near face, S.W. drive, 220ft. level, 0·2 per cent. copper.
No. 4. From across drive near starting point, 220ft. level, 0·6 per cent. copper.
No. 5. From N.E. drive, quartz seam 18in., 220ft. level, 0·7 per cent. copper.
No. 6. From ore on top of winze, said to have been obtained in sinking same at 108ft. level, 2·0 per cent. copper, ½dwt. gold per ton.
No. 7. From across S. drive for 5ft., 108ft. level, 1·9 per cent. copper.
No. 8. From across rise, W. drive, 108ft. level, 1·6 per cent. copper.
No. 9. From across E. drive for 5ft., No. 4 shaft, 56ft. level, 5·6 per cent. copper, 1oz. 2dwts. silver, and 2½dwts. of gold per ton.
No. 10. From S. side, E. drive, 56ft. level, 3·1 per cent. copper, 12dwts. silver per ton.
No. 11. From old stope, for a width of 5ft., 20ft. level, 8·2 per cent. copper, 16dwts. silver, 2dwts. of gold per ton.
No. 12. From old stope for a width of 5ft., E. of No. 2 shaft, 20ft. level, 4·4 per cent. copper, 1dwt. of gold per ton.
No. 13. From N. and S. seam, N. drive, 56ft. level, 1·4 per cent. copper and 2½dwts. of gold per ton. (8–10–15.)

The Mount Sienna Mine (*vide* Record, page 282).—Situated on sections Nos. 1 and 2, hundred of Talunga, about 3 miles from Blumberg.

A fair amount of mining work to shallow depths has been done at different points on this property. A number of old prospecting pits and openings are visible along

the outcrop in a N. and S. direction for a length of about 8 chains, exposing ferruginous material of considerable width, containing in places high percentages of oxide of iron (Fe_2O_3).

This mine was worked many years ago for gold, but there is no record to show the amount of gold obtained. Latterly work was carried on for some time for ochre. This was procured at different depths from surface down to the 80ft. level. A fairly large quantity of lode material appears to have been extracted from this level and treated, and the pigment obtained was all marketed and proved to be of good quality.

The main workings on the blocks consist of an underlie shaft sunk in the formation to a depth of 100ft., and one vertical shaft 8ft. by 4ft. in the clear, strongly timbered, and sunk to a depth of 127ft. A good supply of water was intersected in this at 90ft. from the surface. At the 80ft. level a plat has been cut out and a crosscut extended W. 45ft. At this point the formation was intersected, and both the vertical and underlie workings have been connected and the drive in the lode extended N. for a distance of 35ft. and S. 10ft.

The lode matrix disclosed in these workings is from 20ft. to 25ft. wide, consisting of cellular quartz, brown iron, pyrites, and gossan, with alternate beds of argillaceous sandstone, micaceous clay, and kaolin. These various beds and the adjacent country rock have been penetrated in places by oxide of iron, coloring them yellow and brown, resembling ochre; but the real brown and yellow ochre occurs in irregular seams, bunches, and pockets, and on account of this irregularity in occurrence it is impossible to give an estimate of the quantity of ochre available on the blocks; but considering the great width of the formation as at present shown and the surface indications along the outcrop, there is every appearance that when the mine is more extensively developed by driving along the lode N. and S. enormous quantities of material containing ochre will be made available for stoping and treating from water level to surface.

At a point along the line of strike, about 500ft. S. from the main workings, a prospecting shaft recently sunk is down a total depth of 50ft. At the bottom a crosscut has been extended W. in ferruginous material for a distance of 120ft. At a point in the crosscut 20ft. in from the shaft a seam of argillaceous sandstone was passed through containing a fair percentage of ochre. A sample of the vein material stacked on surface gave 8·8 per cent. oxide of iron.

The large formation exposed in the main underlie workings were sampled in two places taken in sections across the whole body.

				Oxide of iron. (Fe_2O_3).
No. 1 sample.—35ft. level,	No. 1 section, for	2ft.	.....	75·4 per cent.
No. 2 " " "	No. 2 " "	4ft.	.....	71·3 "
No. 3 " " "	No. 3 " "	6ft.	.....	33·1 "
No. 4 " " "	No. 4 " "	6ft.	.....	20·8 "
No. 5 " " "	No. 5 " "	4ft.	.....	58·7 "
No. 6 " 80ft. "	No. 1 " "	5ft. 6in.	....	70·0 "
No. 7 " " "	No. 2 " "	5ft. 6in.	....	74·8 "
No. 8 " " "	No. 3 " "	5ft. 6in.	....	73·7 "
No. 9 " " "	No. 4 " "	5ft. 6in.	....	80·4 "
No. 10 " " "	No. 5 " "	5ft. 6in.	....	72·4 "
No. 11 " From a dump of material on surface				56·4 "

Two of the samples, Nos. 3 and 4, taken at the 35ft. level, gave traces of gold. (20–12–15.)

LOCALITY—LOWER NORTH.

THE DELSIE COPPER MINE.—Situated on section 251, hundred of Neales, 1 mile N.W. from Sutherlands Railway Station.

About 3 chains S. from the main road to Sutherlands a fair amount of prospecting work has recently been done in the outcrop of copper-bearing formation.

The main workings, situated on elevated ground, about 40ft. above the plain, consist of an open cut 15ft. long by 12ft. wide, and at one point carried down to a depth of 25ft. The vein of ore disclosed is small, varying in width from 3in. to 6in., consisting of ferruginous quartz and ferricalcite with pyrites and small patches of high grade copper ore. The ore channel for the length exposed is ill defined and of an irregular nature, traversing hard calcareous and argillaceous sandstone N. and S., dipping at an angle of 70° W. At a point 20ft. down the underlie workings a quartz vein 6in. to 9in. wide, containing a fair amount of pyrites, is exposed, bearing N. and S., dipping E. at right angles to the copper vein. Near the point of intersection of the two seams small patches of copper ore were obtained in sinking, but so far as tested E. from the shaft the quartz seams do not appear to contain any copper.

In the extreme northern point of the open cut there is strong evidence of a fault in the country, bearing N. 35° E., dipping N.W. This appears likely to change the position of the ore channel eastward for several feet in the portion of the ground N. of the present workings. Further prospecting on this part of the property will doubtless determine the full extent of the displacement and may reveal a better ore channel.

At a point 40ft. N. from the displacement a vertical shaft 8ft. by 4ft. was recently sunk to a depth of 12ft. By continuing this deeper and crosscutting the country E. and W. at a reasonable depth a new block of ground will be tested with a fair chance of intersecting the present vein of ore further N. in a more settled belt of country.

About a quarter of a mile E. from the present working on top of a small rise a prospecting hole has been sunk to a depth of 3ft.; in this a strong quartz lode 2ft. to 3ft. wide is exposed. The quartz contains a fair amount of pyrites, the matrix is of a promising nature, and likely material to carry gold. This formation appears well worth testing to a greater depth.

Eight samples taken from various parts of the workings gave the following results:—

No. 1.—From cross quartz vein in underlie, 20ft. level, nil.
No. 2.—From lode vein, 5in. vein. in underlie, 20ft. level, 4·1 per cent. copper.
No. 3.—From N. end of shaft, vein 6in., in underlie, 25ft. level, 2·1 per cent. copper.
No. 4.—From S. end of shaft, vein 6in., in underlie, 25ft. level, 0·9 per cent. copper.
No. 5.—From centre of shaft, vein 6in., in underlie, 25ft. level, 5·0 per cent. copper and 10dwts. silver per ton.
No. 6.—From small quantity of picked ore on surface, obtained in sinking, 11·8 per cent. copper and 18dwts. of silver per ton.
No. 7.—From quartz dump on surface, nil
No. 8.—From hole, 3ft. quartz lode, 2ft. wide, nil.

As shown by the results from the eight samples taken at different places in the three veins the mineral contents at the various depths tested are discouraging, but deeper prospecting in the vicinity and also N. of the disturbed zone may possibly reveal a more productive ore channel. (2–11–15.)

LOCALITY—NORTH.

The Dorris Fabian Copper Mine (*vide* Reviews Nos. 19, 20, and 22).—Situated about 26 miles N.E. of Leigh's Creek.

The property adjoins Paull's Consolidated Mine on the E. The Paull line of lode traverses the block in an E. and W. direction and a fair amount of prospecting has been done at different points along the line of strike for the whole length of the block by small open cuts and shaft sinking, in all of which a copper-bearing formation

of a similar nature to the one operated on in Paull's Mine is disclosed, consisting of calcareous claystate and siliceous ironstone, with thin veins of copper glance and carbonate of copper. Some of the veins are fairly rich in copper ore, chiefly bornite, cuprite, and malachite.

At one part of the block, on rising ground, about 150ft. above the plain, two prospecting shafts, about 35ft. apart, were sunk some years ago in what appears to be two parallel formations to depths of 9ft. 6in. and 12ft. respectively. Recently the claimholder decided to further sink the 9ft. 6in. shaft to a depth of 100ft. with a view of proving the two formations by crosscuts at that level. The top of the shaft has been timbered 4ft. above surface and 33ft. 6in. of sinking done by contract, making the total depth of 47ft. from brace to bottom. The formation disclosed in the top shaft consists mainly of calcareous claystone with siliceous ironstone veins 3ft. 3in. wide, containing in places specks of carbonate copper ore. The formation as far as sunk in is of very low grade. Further sinking may disclose better grade ore in the present channel. (26–8–15.)

The Gilead P. Beck Silver-lead Mine (*vide* Record, page 173).—Situated on W. side of Duck Pond Creek, about 90 miles N.E. from Farina township.

On the top of Duck Pond Hill, 40ft. above the creek, a shaft has been sunk to a depth of 60ft. (or 10ft. below water level). At 50ft. in the shaft a small plat has been cut out and a drive on the course of the lode formation has been extended W. a total distance of 50ft. (through to No. 2 shaft); over the drive the ore has been stoped out to within 10ft. of surface. The lode formation in drive and stope is well defined, bearing E. and W., with a slight angle off the vertical to the S. The lode matrix consists of decomposed claystates, quartz, and gossan, with seams and bunches of galena ore.

From No. 2 shaft, at 40ft. level, the drive W. on the course of the lode is in 20ft., and the drive E. 3ft. The formation in all the workings is from 3ft. to 4ft. wide, containing in places rich bunches of galena. The ore channel exposed for the length of the present workings has the appearance of having been an extensive fissure and likely to continue down.

The principal work now in progress on the mine is the extension of the W. drive and stoping out the ore above water level, but the owner intends shortly to have the workings of the main shaft unwatered and to resume sinking the shaft to prove the ore body at greater depth. There are now about 55 tons of first and second class ore dressed on surface ready for dispatch to market.

Sample taken in the face of W. drive for a width of 3ft. gave on assay 17·2 per cent. lead and 5ozs. 10dwts. of silver per ton.

Sample taken from the bottom of W. drive, 50ft. (water level), 29·1 per cent. lead and 8ozs. 10dwts. silver.

Sample taken from face of E. drive for a width of 3ft., 49·6 per cent. of lead and 11ozs. 4dwts. silver per ton.

Sample taken from first grade ore dump of 20 tons, 72·9 per cent. lead and 15ozs. 8dwts. of silver per ton.

Sample taken from second grade ore dump of 35 tons, 53·2 per cent. lead and 13ozs. silver per ton.

The lode formation disclosed in the present limited workings is persistent in nature, and as shown by the above samples contains silver lead ore of fairly high value. The future prospects of the mine at deeper level appear very promising and fully justify further sinking of the present shaft. (29–8–15.)

The Bluff Silver-lead Mine.—Situated about 83 miles N.E. from Farina Railway Station, near Duck Pond Hill.

The main workings are situated on the W. side of a hill, 100ft. above the gully, where a vertical shaft has been sunk to a depth of 30ft. in country rock, consisting of quartzite, mica schist, and sandstone with small veins of quartz. At 10ft. in

the shaft a soft seam of kaolin 3in. to 10in. wide was passed through. This does not appear to contain any mineral of value; the rocks exposed in the shaft are of a compact and settled nature, but no lode formation so far has been disclosed in this working.

About half a chain N. from the shaft at the foot of the hill in a trench 39ft. long, N. and S., and 3ft. to 4ft. deep, two veins of ferruginous quartz, 2ft. 6in. apart, are exposed, each about 6in. wide, strike E. and W., dip S. In the southern end of this open cut a fairly defined iron seam 9in. wide is showing, bearing E. and W., dipping N. at right angles to the bedding of the country rocks.

Five chains to the N.E., in a hole 4ft. deep, a vein of quartz and ironstone, 12in. wide, is exposed, bearing E. and W., dip N. Further E. 1 chain a fair amount of prospecting work has been done. In one hole, 9ft. by 6ft., sunk to a depth of 10ft., a soft arenaceous formation 6ft. wide is showing, bearing E. and W., dipping slightly to the S.; the matrix is mainly decomposed sandstone and clayslates that do not appear to contain any minerals of commercial value.

For a considerable distance S. from the main shaft workings a large number of irregular quartz leaders, varying from 1in. to 12in. wide, are showing in the comb of the rocks. These groups of leaders extend E. along the hill top for a distance of about 10 chains, resembling lode formations, but at different points deviate from the eastern course conformable with the contortion of the various rocks. In different places along the line of strike some shallow trenching has been done, but not to a sufficient depth to determine if the leaders will form a more compact body going down.

Ten samples taken of the material exposed in the different workings gave on assay:—

Nos. 1 and 2.—From outcrop of quartz veins E. end of hill, both nil.
Nos. 3 and 4.—From trench top of hill, both nil.
No. 5.—Dump of 1½ tons of quartz top of shaft, nil.
No. 6.—Dump of half ton kaolin from 10ft. down shaft, nil.
No. 7.—Vein 6in. in trench N. of shaft, nil.
No. 8.—Vein 9in. in trench N. of shaft, nil.
No. 9.—Vein 12in. in hole 4ft. deep, N. of shaft, nil.
No. 10.—Open cut 10ft. deep, formation 6ft., nil.

From my inspection and the results of the above samples, I consider the prospects of this property not by any means encouraging, and cannot suggest any particular mode of future development or prospecting. (29–8–15.)

Asbestos Mine (*vide* Review No. 16).—Situated in the hundred of Bright, 8 miles N.E. from Robertstown.

A number of the surface deposits of asbestos traversing this property were discovered about 15 years ago, and at one place on the side of a creek a fair amount of shallow work was done, disclosing several seams 1in. to 4in. wide, showing fair sized fibre, and it is said that from these workings about 16 tons of asbestos were extracted and marketed, but further work at that time was suspended. Subsequently intermittent prospecting was done by different parties at various points on the property with highly satisfactory results, as it proved several deposits which appear likely to contain asbestos of fairly high value.

The present local syndicate having acquired mineral claims on section 3A, hundred of Bright, are now carrying on vigorous prospecting and developmental work on different parts of the holdings.

The main workings are situated on elevated ground rising gradually to about 50ft. above the plain, and consist mainly of open-cut work, 8ft. to 10ft. wide, which has now been extended on a slight angle of dip S.W. for a distance of 60ft., with a face 6ft. to 8ft. high, and at one point near the extreme western end a hole has been carried down 6ft. by 4ft. from the floor of the cutting to a depth of 6ft. In this and along the bottom of the workings several very promising seams of crocidolite or blue asbestos of medium length of fibre are exposed.

During the last few months over 5 tons of fairly long fibre asbestos has been extracted from the above open workings; this has now been sorted and bagged ready for market.

For a distance of 40 chains E. from the open cut at different points prospecting holes have been sunk to depths of from 2ft. to 3ft., in which short fibre asbestos bearing rock is disclosed.

Six samples taken of the asbestos rock and seams showing in the different workings were tested at the School of Mines:—

No. 1 from open cut.—Rock with crocidolite of little value.

No. 2 from open cut.—Crocidolite, medium length, good quality.

No. 3 from No. 2 hole, 4ft.—Decomposed rock with short fibred crocidolite; no value.

No. 4 from No. 1 hole, 2ft.—Rock containing no value.

No. 5 from No. 3 hole, 2ft.—Short fibred crocidolite and limestone.

No. 6 from open cut.—Put in bags, long fibred crocidolite of good quality.

As shown by Nos. 2 and 6 samples and from my inspection, the asbestos disclosed in the most advanced workings is a good marketable product, and in the shallow pits where other deposits are being exposed the indications are promising and suggest that when further developed better quality asbestos may be discovered. (3–11–15.)

LOCALITY—NORTH-EAST.

The Lewis Copper Mine.—Situated about 1½ miles from Petersburg, on Mr. S. Sleep's property.

The workings are mainly of a prospecting nature. At one point an opening has been made E. and W. for a length of 22ft. by 4ft. wide and to a depth, at one point, of 35ft. In these workings two small veins 1in. to 3in. wide, consisting of ferruginous quartz and slates containing copper ore, are disclosed, one bearing E. and W and going down vertically, the other crossing it N. and S. and going down to the E.

About 15ft. farther W. a hole has been sunk to a depth of 7ft. in the country rock, consisting of soft grey slate containing no copper values.

At a point 75ft. from the last workings a fair amount of prospecting work has been done in a N. and S. leader. An open cut along the line of strike has been made for a length of 39ft. by 8ft. deep, and at one point in the cutting a shaft has been sunk to a depth of 20ft. The vein disclosed in these workings is from 3in. to 4in. wide, containing in places stains and specks of carbonate ores. The prospecting work done up to date on this property shows that there is copper ore in the locality, and it is quite possible that the small veins already proved are only off-shoots from larger and more defined ore channels. To determine this and further prove the property I would suggest systematic trenching work be done at different points in an E. and W. direction across the comb of the bedded country slates.

On the adjoining block (Mr. Blunsden's property) a pit was recently sunk 4ft. by 3ft. to a depth of 3ft. In this a fairly defined vein of copper ore is exposed, 3in. to 5in. wide, bearing E. and W. This appears a fairly promising vein, worth further sinking being done on the angle of dip to prove it at greater depth. A sample taken of this vein at the depth of 3ft. gave 16·4 per cent. copper.

Samples taken of the veins exposed in Lewis's open workings gave the following results:—

		Copper.
No. 1 sample.	From No. 1 open cut, 30ft. deep, vein 2in...	0·6 per cent.
No. 2 "	From No. 1 open cut, 30ft., cross vein 3in...	5·8 "
No. 3 "	From bottom No. 2 open cut, 8ft. deep, vein 4in.	2·4 "
No. 4 "	Ferruginous claystone in dump	0·5 "
No. 5 "	Ironstone, 300ft. N.E. from workings.....	Nil

(31–8–15.)

The Penn Copper Mine.—Situated 2½ miles from Oodla Wirra, on section 77, hundred of Coglin.

About 13 years ago a large amount of work was done on this property. Two shafts, 96ft. apart, were sunk to depths of 157ft. each, with drives at that level connecting the two workings. From the bottom drive two winzes, 10ft. apart, in separate veins of ore have been sunk to depths of 70ft. each, a total depth from surface to water level of 227ft. A large formation of thin-bedded clayslate traverses the block, bearing N. 45° E., with a dip to the N.W. of 15° off the vertical. The veins of ore operated in as disclosed in the old workings were from 10ft. to 20ft. apart, crossing the slate formation at nearly right angles in an E. and W. direction, with a slight dip to the S. These series of ore channels appear to be from 25ft. to 30ft. in length, varying in width from 4in. to 10in., thinning down to nothing at different points along the line of strike, and also going downward. At different levels in both shafts driving has been done for the full extent of the various seams, and the ore has been stoped out between the drives down to water level. The various seams of copper carbonates operated on in these workings are stated to be of very high grade, and that ore to the value of £2,000 was extracted at that time.

About 8 chains S. from the main workings a large amount of prospecting work has been done in the same slate formation by trenching in various directions to depths of from 2ft. to 4ft., and at different points two shafts have been sunk to depths of 50ft. and 150ft. respectively. The prospecting on this part of the block was discouraging, as only small veins and patches of copper ore were disclosed.

Recently Mr. Carroll and party acquired this property. Work is now carried on at the 70ft. level in the main shaft. A drive W. is in a total distance of 50ft., in the face of this drive a crosscut has been started. The work of extending it N. is now in progress with a view of testing this portion of the block at a reasonable depth from the surface. This appears to me the best mode of prospecting, considering the nature of the ore bodies and that a large number of the ore channels were exposed in the old workings, of which only a few extend up through the surface. (21–9–15.)

The Darley Dawn Gold Mine (*vide* Review No. 20).—Situated about 1 mile W. from Mount Grainger Mine.

Prospecting work to shallow depths has been done on different parts of the block, and at one point an underlie shaft has been sunk to a depth of 25ft. The lode channel exposed in these workings strikes N. 45° E., dipping S.E. at right angles to the country slates. The lode matrix consists mainly of decomposed slate and quartz leaders with pyrites 6in. to 10in. wide. This appears a likely ore channel to continue down to a great depth and could be further proved by continued sinking on the true angle of dip.

About 2 chains farther N.W. a prospecting hole is down 3ft. The vein of quartz showing in the bottom is 3in. to 4in. wide, going down in conformity with the bedding of the country rocks.

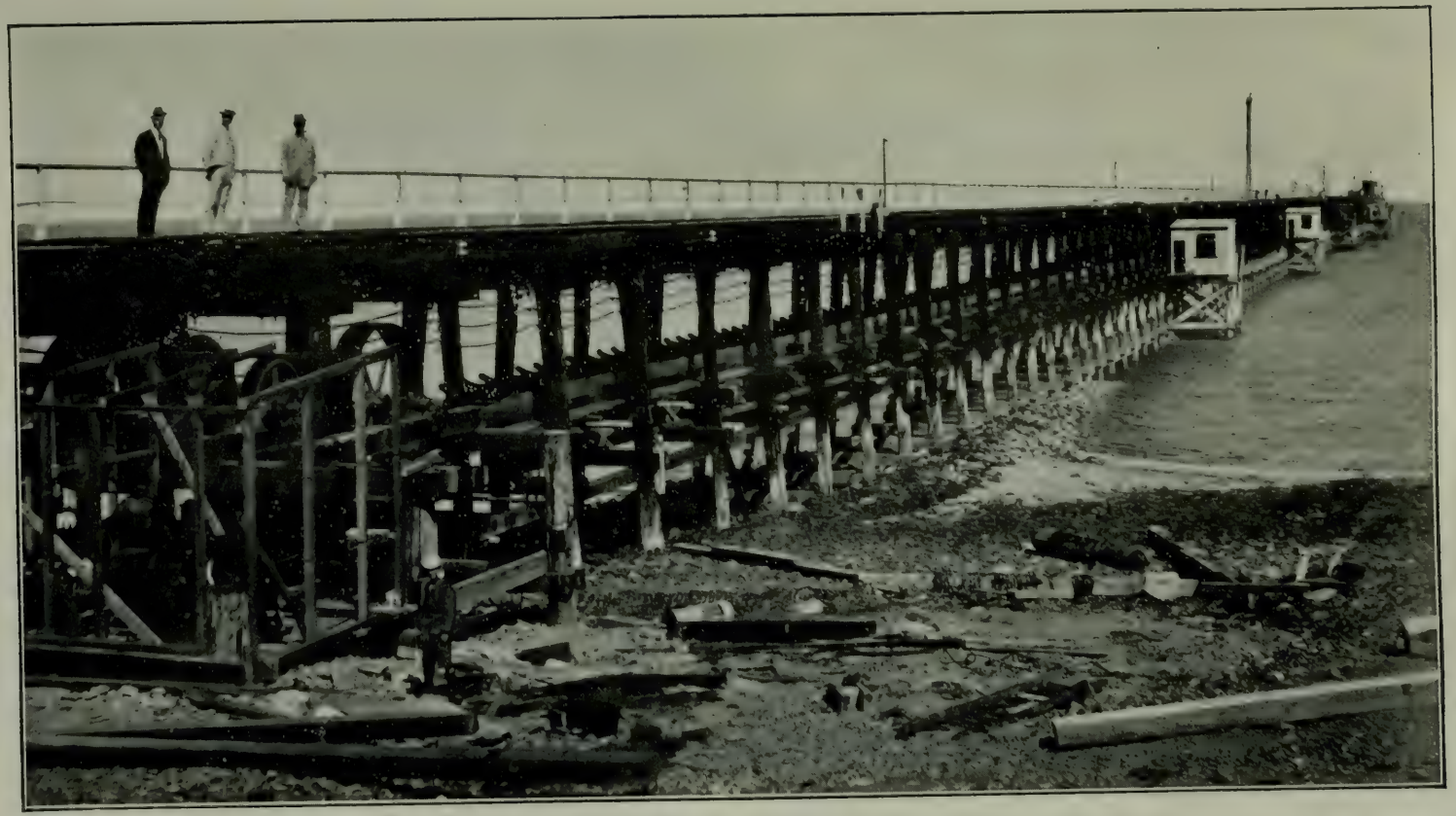
A short distance S.W. from the underlie workings prospecting has been done along the outcrop of the formation for a length of 10ft. by 5ft. deep. The lode material exposed here is fairly defined, bearing N. 45° E. and consisting of ferruginous quartz with pyrites 6in. to 8in. wide, likely to contain rich stone in places.

Three samples taken off the veins in the different workings gave the following results on assay :—

No. 1.—Underlie shaft, 25ft. deep, vein 10in., gave 6dwts. gold per ton.
No. 2 sample.—N.E. hole, 3ft., vein 4in., gave 1½dwts. gold per ton
No. 3 " S.W. hole, 5ft., vein 6in., gave 6dwts. gold per ton.

(21–9–15.)

The Wade Copper Mine.—Locality about 5 miles W. from Dawson township, on section 165, hundred of Coglin, in hills rising 100ft. to 150ft. above the water



Face p. 52.] **Hummocky Point Jetty, showing Motor Houses and Rubber Belt.** [Photo by J. Jobson.

courses and gullies. A number of ferruginous quartz reefs and quartz leaders traverse the blocks in different directions, some bearing N. and S. and others crossing them at nearly right angles E. and W., and varying in width from 3in. to 24in.

No. 1 workings consist of an irregular underlie shaft in an E. and W. formation, carried down on an angle of 25° N. to a depth of 40ft., chiefly in decomposed material, with bunches of quartz containing copper carbonates and ironstone. The lode at the present shallow depth is ill defined and of low grade.

At a point 15 chains farther W. a prospecting hole 6ft. by 5ft. is down 14ft. In this a vein of ironstone is exposed bearing N. and S., dipping E. The vein is from 3in. to 5in. wide, stained with copper carbonates. Some trenching has been done here for a length of 20ft. by 18in. deep; but up to that depth no formation containing any value appears to have been discovered.

On top of the hill, about 150ft. above the gully, a fair amount of prospecting work has been done at different points by trenching and one open cut 12ft. with 6ft. face, in which the lode matrix exposed is mainly ferruginous quartz, 4ft. to 6ft. wide, strike N. and S., with a slight dip E. South from the open cut a trench has been made for a length of 60ft. by 1ft. to 2ft. deep, exposing several quartz leaders that do not appear to contain any copper ore.

About 2 chains W. from the open cut a small prospecting hole is down 5ft., showing in the bottom and sides a fairly defined seam consisting of ironstone with copper stains 12in. wide, bearing N. and S., dipping at an angle of 30° W. At a point on the side of the hill a tunnel is in 30ft., but it does not appear to be far enough E. to intersect the iron vein.

Farther S. on the side of the hill in a trench 15ft. long and 2ft. deep a fair-sized lode formation is exposed consisting of quartz and calcite with iron veins containing copper carbonates, strike N. and S., dip W. At the foot of the hill an open cut has been carried in E. for a distance of 27ft., and from that point a tunnel has been extended E. for a total distance of 54ft., in the face of which a large body of ferruginous quartz is exposed for a width of fully 4ft., and is probably much wider, as the footwall has not been reached in the drive. This appears a strong lode formation, but it does not contain any copper values at this point.

A number of the various reefs exposed in the different shallow workings are of a fairly defined nature, and the lode matrix is impregnated with iron veins and iron oxide and some of the seams contain copper ore in places; but as shown by the 12 samples of lode material taken from various parts of the present workings the copper contents have proved of low grade and discouraging, but possibly when the lodes have been more extensively opened out better values may be discovered.

		Copper.
No. 1 sample.—	From face of underlie, 40ft., vein 12in.	Nil
No. 2 "	From side of underlie, 30ft., vein 12in.	Nil
No. 3 "	Surface dump, obtained in sinking, about 1 ton	6·2 per cent.
No. 4 "	Hole, 14ft. deep, vein 3in.	3·1 "
No. 5 "	Hole, 2ft. deep, vein 3in.	Nil
No. 6 "	Open cut, 6ft. deep, taken for width of 6ft...	0·3 per cent.
No. 7 "	Open cut dump of 2 tons.....	1·7 "
No. 8 "	Hole, 5ft. deep, vein 12in., 12dwts. silver ..	5·2 "
No. 9 "	Trench, 3ft. deep, vein 9in., 4dwts. silver ..	4·5 "
No. 10 "	Face of tunnel, taken for a width of 6ft. ...	Nil
No. 11 "	Outcrop on top of hill, vein 12in.	Nil
No. 12 "	Outcrop E. side of hill, vein 18in.	Nil

(22–9–15.)

The Mount Grainger Gold Mine (*vide* Record, page 250, Review Nos. 8, 9, 13, 14, 15, 16, 17, 18, 19, 21, and 22, and Geological Report No. 2).

On the E. side and near the top of Mount Grainger Hill, about 300ft. E. from the main shaft, some mining work has recently been done by the present party of tributers in the lode formation traversing this property.

An underlie shaft started from the outcrop has been carried down in the hanging wall portion of the lode on an angle to the S.W. to a depth of 30ft. The portion of the formation operated in consists of sandstone and kaolin, with quartz and ironstone veins of various thickness carrying a little gold.

From the underlie shaft a tram line 600ft. in length has recently been constructed along the N.W. side of the hill, and the ore is now conveyed in trucks from the shaft direct to the plant; 25 tons of ore extracted in sinking were treated recently by the battery on the mine and gave a total return of 2½ozs. of gold by amalgamation, and the tailings from the parcel assayed 6dwts. of gold per ton, thus showing that the lode material treated from this part of the property carried 8dwts. of gold per ton. Water for crushing and cyanide purposes is obtainable in ample quantity in the main shaft adjacent to the plant. (23–9–15.)

The Golden Junction Gold Mine (*vide* Record, page 219, and Reviews Nos. 19, 20, 21, and 22).—Situated Mount Grainger Gold Field.

The main vertical shaft was sunk some years ago by a previous company to a depth of 177ft. (or 14ft. below the 163ft. plat). Now a contract has been let to a party of men to continue the shaft down a further depth of 100ft. to get the necessary water supply prior to the erection of a treatment plant on the mine.

A new horsewhip and pent house over the top of the shaft have been erected, and the necessary timber has been put in to secure the bottom of the plat at the 163ft. level, and 4ft. 8in. of sinking done, making the total depth 181ft. 8in. from the surface, and now that everything is in good working order and that the country rock in the shaft is chiefly ferruginous slate favorable for working, it is anticipated that good progress will be made with the work.

No. 2 underlie shaft, situated near the foot of the hill, is down a total depth of 44ft., and sinking is in progress. The formation exposed here is the full width of the shaft, 5ft. to 6ft. wide (with no walls showing). The lode matrix is chiefly sandstone and clayslates with numerous quartz and ironstone veins, varying in width from ½in. to 3in. wide, traversing the formation in various directions. Apparently a promising material for carrying gold and worth testing to a greater depth. (23–9–15.)

The Myrtle Gold Mine (*vide* Record, page 214, Reviews Nos. 8, 13, 14, 15, 16, 17, 21, and 22).—Situated at the Dustholes, 2½ miles W. from Mount Grainger.

A fair amount of highly necessary work has recently been done on this property. In the vicinity of the main workings a water shaft, 8ft. by 4ft. in the clear, has been sunk from surface down to a total depth of 137ft. vertical. The country passed through in sinking consists mainly of bedded quartzite, sandstone, and slate, with quartz veins, and at one point a large vugh with quartz crystals is showing.

At the bottom of the shaft crosscutting in a W. direction is now in progress, and the crosscut is in a total distance of 30ft. The country rocks exposed in .this drive consist mainly of alternate layers (or beds) of sandstone, quartzite, and slates, bearing N. 20° E., dip W., at an angle of 45°. The absence of iron oxide at this level is noticeable, and some of the strata are damp and porous, indicating that the water zone is quite close, and it appears quite possible that by the further sinking of the present shaft there is a reasonable chance of cutting a supply of water. The shaft is equipped with good strong ladders and necessary staging, and the erection of a horsewhip is now in progress. Adjacent to the open cut a good site for a treatment plant is being selected and foundations for the same partly taken out. A 7,000-gall. galvanized iron tank is being placed in position; two-room assay office and blacksmith shop erected. (23–9–15.)

THE NORTH-WESTERN GOLD AND COPPER FIELDS.

The Port Augusta-Kalgoorlie Railway has now been constructed up to and for some distance past the Tarcoola Goldfield. I arrived at the latter place, a distance of 259 miles from Port Augusta, on July 17th, and during the following four weeks inspected the different holdings on the fields.

The Tarcoola Blocks (*vide* Record, page 286, and Reviews Nos. 9, 17, 18, 19, and 22) comprise several leases situated about 1 mile N. from the railway line, and during the last 15 years a large amount of mining work has been carried on by the company.

The main workings, situated on lease 1005, consists of one large underlie shaft 500ft. deep, and one vertical shaft 12ft. by 4ft. in the clear, strongly timbered to a depth of 350ft. At the 108ft., 250ft., and 300ft. levels a large amount of driving, crosscutting, and stoping has been done, disclosing a number of gold-bearing reefs, five of which have been operated on in the main workings for a fair extent along the lines of strike and down to a depth of 250ft. vertical (which is comparatively only a shallow depth). From the drives and stope workings in the various reefs up to March, 1912, 30,929 tons of ore were extracted and treated by the plant on the mine for a yield of gold bullion worth 85s. per ton.

For the last three years the principal work carried on has been solely confined to proving and developing by tunnels and open cuts the various reefs traversing the blocks adjacent to the main workings. In these workings are exposed several lodes, varying in width from 6in. to 36in. wide, carrying shoots of fairly rich ore, and a number of parcels therefrom treated at the Government plant gave very satisfactory returns, showing the satisfactory gold-bearing values of the various reefs tested on the different blocks, which have, so far, only been worked to a few feet below surface.

The main shaft has recently been equipped with an oil engine and pumping plant of a capacity of 6,000galls. per hour, and when the mine has been unwatered mining on a larger scale will doubtless be carried on and the ore treated by the plant on the property.

The Tarcoola Morning Star Mine.—The work of sinking a new shaft is now in progress with a view of intersecting the rich shoot of ore going S. followed down for some distance by underlie workings. This shaft will greatly facilitate the work of hauling the material, proving the ore channel, and working the mine at greater depth. The returns from the ore treated from this block at the Government plant (*vide* previous Reviews, and page 14) are highly satisfactory, and should encourage the owners to vigorously develop the mine to a greater extent.

The Tarcoola Perseverance Mine (*vide* Reviews Nos. 14, 15, 16, 17, and 19).—Shaft sinking has been done here to a depth of 110ft., and drives carried in on the course of the ore channel 96ft. N. and 30ft. S., thus proving the ore body for a total length of 120ft., and over the back of these drives a large amount of stoping has been done. The ore body disclosed in these workings is from 3ft. to 3ft. 6in. wide, of kaolin and quartz, carrying rich gold, as proved by the high returns from the parcels of ore treated at the Government Cyanide Plant within the last two years (*vide* previous Reviews).

During the period worked, over three years, the mine has developed well; the persistent nature of the lode channel and the high value of the ore extracted show beyond any doubt that it has passed the prospecting stage and should be opened out and worked on a much larger scale.

Royal George Mine (*vide* Record, page 297).—Situated three miles W. of Tarcoola Hills, thus proving that the auriferous area at Tarcoola is fairly extensive.

This mine has been worked off and on for about 12 years, and several parcels of ore treated gave fair returns in gold. Since the present party acquired the property work has been carried on continuously. One underlie shaft has been sunk to a depth of 115ft.; drives on the course of the lode at 40ft. and 80ft. levels are in 36ft. and 40ft. respectively. The ore body disclosed is well defined and consists of decomposed granite and ferruginous quartz 4ft. to 4ft. 6in. wide, carrying fair average values in gold, about 15dwts. per ton, as shown by the parcels of ore treated from the present workings at the Government Cyanide Works.

The ore channel so far disclosed in the various workings is wide and well defined, and the lode matrix is of a favorable nature for working at small cost.

Tarcoola Day Dawn Mine (*vide* Reviews Nos. 17, 19, and 20).—Situated on the plain between Tarcoola Hills and the railway line.

A large amount of good developmental work has been done on this property. Several shafts have been sunk to depths of from 60ft. to 116ft. Water was struck in the latter at 112ft. from the surface. Two parallel ore channels are disclosed on this property, bearing nearly N. and S. The lode matrix consists mainly of kaolin and quartz 4ft. to 8ft. wide, carrying good values in gold, as shown by the returns from the Government Cyanide Works during the last two years (*vide* previous Reviews and page 14).

The length, depth, and size of the ore bodies already proved on this property, and the values of the ore extracted show that this is likely to develop and prove to be a large mine.

Prospecting work is in progress over a considerable area at different points on the field, and the parcels of ore treated from the different places by the Government plant show that the auriferous belt of country is very extensive, and that all the reefs so far disclosed carry fair values with shoots of exceedingly rich ore in places. The future prospects of the field are of a highly encouraging nature.

Lake Labyrinth (*vide* Reviews Nos. 17, 18, and 22).—Situated about 30 miles E. from Tarcoola.

A fair amount of prospecting work has recently been done in this district, and several quartz reefs of promising nature traversing the granite country rock have been disclosed.

On a small rise 20ft. above the plain a number of prospecting holes have been put down in the outcrops of two parallel reefs, 50ft. apart, and at one point two working shafts have been sunk to depths of 40ft. and 56ft. respectively. The formation disclosed is chiefly quartz and decomposed granite 6in. to 24in. wide, carrying gold. A drive E. and W. in the lode at the 40ft. level is now in progress. Two parcels of ore obtained in sinking and driving treated at the Government plant Tarcoola, gave the following return :—Total quantity, 28 tons ; 24ozs. 5dwts. 22grs. gold ; bullion valued at £87 18s. 10d. A third parcel of ore is now being carted to the battery. Considering that the ore was not sorted, but sent to the battery as it came out of the mine, I consider the gold value very satisfactory.

Earea Dam Gold and Tin Field (*vide* Record, pages 307-310, and Reviews Nos. 17, 21, and 22, *Wilgena Enterprise*).

Gold was discovered here about 16 years ago ; several leases were pegged out and a large amount of prospecting work done by trenching and shaft sinking on the different blocks. Work on some of the blocks has been carried on intermittently for a number of years, and several parcels of ore extracted from the various workings were treated at the Government Cyanide Plant, Tarcoola, giving fairly high average returns. During the last 12 months a fair amount of mining work has been in progress on lease No. 1521 by trenching and shaft sinking. One shaft has recently

been sunk to a depth of 30ft., in which an ore channel is disclosed 15in. wide with a vein of ferruginous quartz on the hanging wall carrying gold. A parcel of 5 tons of ore from this shaft treated at the Government Plant, Tarcoola, gave a total return of 5ozs. 10dwts. 22grs. of gold (*vide* page 14 for later return).

About 1½ miles S. from the gold leases tin-bearing ore was discovered some years ago, and a number of blocks were pegged out and a large amount of trench sinking was done along the side of the lake and several shafts sunk to shallow depths in the bed of the lake. These are now full of salt water, and no work to further prove the property appears to have been done for many years (*vide* Record, page 310, and Review No. 17).

Glenloth Goldfield (*vide* Record, page 311, and Reviews Nos. 9, 16, 18, and 19).—Situated in the vicinity of Lake Harris, about 36 miles S.E. from Wilgena head station.

Gold was discovered in this locality in 1893, and a large amount of prospecting and mining has been done at different points in the auriferous belt for a length of 6 miles by 3 miles wide, and the sinking on some of the mines has been carried down to a depth of 130ft. in ore channels with every appearance of permanency.

The battery and cyanide plant erected on the shore of Lake Harris treated from different mines up to June 30th, 1915, 3,273 tons of ore, yielding a total of 2,484ozs. of gold bullion valued at £8,341.

Fabian's No. 3 Mine.—Situated 1 mile N.E. from Glenloth Well. A very large amount of good development work has been done on this property, viz., five shafts sunk along the line of strike to depths of 30ft., 100ft., 70ft., and 80ft. respectively, and one main shaft W. of the lode 6ft. by 4ft. in the clear, strongly and neatly timbered to a depth of 130ft. In the various shafts and by trenching the ore body has been operated in along the line of strike for 740ft. in length, and some of the ore treated gave fairly high returns in gold. This appears a highly promising mining property.

Glen Markie Mine.—Several underlie shafts have been sunk in the lode traversing this block to depths of from 35ft. to 40ft., and the ore stoped out from that level up in place to the surface and for a length along the line of strike of 240ft. The lode formation disclosed appears from 20in. to 24in. wide, carrying from 8dwts. to 12dwts. of gold per ton.

Lone Hand Mine.—At different points along the line of lode for a length of 546ft. a number of shafts have been sunk to depths of from 15ft. to 70ft., and the ore in places stoped out up to the surface. At one point a small break occurs in the lode, in the vicinity of which some very rich ore was obtained. The last 112 tons of ore extracted from these workings and treated at the Government battery gave a total return of 70ozs. 13dwts. 16grs. of gold. Considering the persistence and width of the ore channel in these two mines there should be very little trouble in getting the necessary capital to further develop them at greater depths.

A fair amount of good prospecting work has been done intermittently on many other parts of this field disclosing veins varying in width from 2in. to 12in., carrying fair values in gold. The prospects of the whole area prospected for the occurrence of gold-bearing lodes is exceedingly encouraging and warrants further systematic exploration work in this auriferous belt.

Mount Gunson Copper Mine (*vide* Record, page 91, and Reviews Nos. 9, 10, 15, 16, 17, 18, 19, 20, 21, and 22).—A large amount of mining has been done on different parts of this company's holdings by open cuts, trenching, boring, and shaft

sinking, in which copper bearing material of a promising nature for leaching is disclosed over a large area. The principal work now in progress consists of excavating foundations preparatory for the installation of a large treatment plant. Experimental work as to the best mode of treating the class of ore available has been carried out for some time, and the management anticipates that when the plant as now designed has been erected a large quantity of low-grade ore can be treated with a fair margin of profit.

Pernatty Copper Mine (*vide* Reviews Nos. 10, 20, 21, and 22).—At present a considerable amount of development work is in progress on this property. On rising ground adjacent to the lake a good site has been selected for the new treatment plant now in course of erection, which, as designed, can be added to when it is found necessary to increase its capacity. A train line has been constructed from the mouth of the lake workings up to the rock breaker, and the ore will be hauled up the incline portion by a small oil engine. From the breaker the ore is conveyed to the rolls, and from there to the roaster and leaching and precipitating vats.

In the bed of the lake, a distance of about 15 chains from the plant, the work of developing the ore deposit is in progress. An incline cutting 8ft. wide has been carried down a total distance of 270ft., and near the bottom a start has been made to open out both ways from the main cutting. The face of these workings is from 10ft. to 15ft. high of sandstone and loose sand; the latter in places is 4ft. to 6ft. thick. This is removed prior to the working of the lower portion, which contains apparently the greater portion of the ore occurring in seams and bunches in different parts of the sandstone. The ore at present is stacked on surface, the dump contains several hundred tons obtained from the present open cut and other workings and will be taken up to the plant for treatment as required.

There are a large number of mining blocks taken up in the vicinity of the Mount Gunson and Pernatty Mines, probably containing similar deposits of ore, and I was informed that prospecting work on a large scale will shortly be done on these properties with boring plants and shaft sinking.

Australian Manganese Mining Company (*vide* Reviews Nos. 21 and 22).—A considerable amount of prospecting work has recently been done on this company's holdings by open cut and trench work, and in the various workings very large deposits of high-grade manganese ore are exposed. About 95 tons of the ore has been sent to market, and the work of getting another large parcel of ore for market is now in progress.

On T. J. Gilpin's blocks prospecting work is now in progress by deep trenching, and strong deposits of manganese ore are disclosed on different parts of the holding. These appear likely to extend for a great area.

Blocks Nos. 10051 *and* 10056.—A large amount of good prospecting work is being done at different points on these claims in the various trenches and open cut work and large bodies of high quality manganese ore are showing.

Judging by what can be seen on the different properties that have already had work done on them there is ample evidence that the manganese disclosed extends over a considerable area, and that many thousands of tons of ore could be mined at comparatively small expense, as deep sinking would not be necessary for many years.

Sweet Nell Copper Locality (*vide* Record, page 132, and Reviews Nos. 19 and 20).—Situated about 1 mile E. from Mona Lena Tank.

The ore deposit here is nearly horizontal, and the ore matrix is of a similar nature to that of Mount Gunson and Pernatty Mines. The principal properties are situated on a small peninsula rising 15ft. to 20ft. above the lake. The country rocks are chiefly sandstone and clayslates overlain by sandy loam and a hard bed of dolomite. The lake bed is mostly porous red sandstone impregnated in places with copper carbonates. A copper bearing formation, 1ft. to 3ft. wide, is outcropping all round the peninsula; in this a number of tunnels have been extended into the hill and cross drives and stoping done in different directions. From these workings and the open cuts along the side of the lake a considerable quantity of fairly high-grade ore was extracted and sent to market, and the second-grade ore left, amounting to many hundreds of tons, is now on surface.

On the various blocks adjoining the Sweet Nell a fair amount of prospecting work has been done disclosing similar formations containing copper carbonates. When the various shows in this locality have been more extensively developed and equipped with a cheap method of treating the low grade ores it is quite possible that a fair quantity of marketable copper would be produced in this district.

In concluding this report I beg to state that the prospects of the various mining properties inspected appear highly encouraging, and now that the Port Augusta and Kalgoorlie Railway line passes within a short distance of the different fields the expense of conveying materials to the mines will be greatly reduced. I have every confidence that this will have a beneficial effect and will in no distant date help to greatly revive the mining industry in the western part of this State.

LOCALITY—EYRE PENINSULA.

The Poonana Copper and Silver-lead Mine (*vide* Review No. 22).—Situated on section No. 68, hundred of Mann, about 2½ miles from Cleve.

Since my previous report on this mine a large amount of prospecting and developmental work has been done. At different points along the line of strike, for a distance of 210ft., several prospecting pits, 8ft. to 10ft. apart, have been sunk to depths of from 3ft. to 6ft. In these shallow workings lode matrix of a promising nature is exposed, varying in width from 12in. to 18in., containing seams and bunches of copper and silver lead ore, chiefly azurite, malachite, and cerussite.

An underlie shaft, 8ft. by 4ft., was recently started in the formation. This is now down a total depth of 48ft. The formation in the bottom consists mainly of quartzite and sandstone, 4ft. wide, containing copper and silver-lead in small veins and stains through the matrix. At this depth the ore is of low value, and it appears quite likely that the shaft has passed through the first shoot of ore, but as the ore channel is well defined and the occurrence of the high grade ore is apparently in different shoots, the prospects warrant deeper sinking.

At the 40ft. level a drive has been extended on the course of the lode in the hanging wall portion for a distance of 17ft.

The lode matrix exposed here consists of quartzite and sandstone with seams and bunches of copper carbonates, 12in. to 18in. wide near the hanging wall. The other part of the formation is poor.

The N.W. drive at the 40ft. level is in a total distance of 16ft. The driving here apparently is being done in the foot wall portion of the formation, which apparently is of very little value. I would suggest crosscutting S.W. from the face of the present drive to intersect the main portion of the ore channel. In this the drive would be extended N.W. along a well-defined wall, where, judging by indications in the various surface workings, several shoots of fairly high grade ore are likely to be intersected in that direction.

Nine samples of lode material were taken from the different workings which assayed as follows :—

No. 1.—From hole, 3ft. deep, N.W. of shaft, vein 6in., gave 5·6 per cent. copper, 44·1 per cent. lead, 1oz. 4dwts. of silver.

No. 2.—Hole 5ft., vein 12in., 14·3 per cent. copper, 27·1 per cent. lead, 2ozs. 12dwts. silver.

No. 3.—Hole, best ore, 30·6 per cent. copper, 15·8 per cent. lead, 3ozs. 2dwts. silver.

No. 4.—Hole, 3ft., vein 18in., 1·7 per cent. copper, 42·5 per cent. lead, 4dwts. silver.

No. 5.—Hole, 5ft., vein 12in., 15·6 per cent. copper, 18·4 per cent. lead, 12dwts. silver.

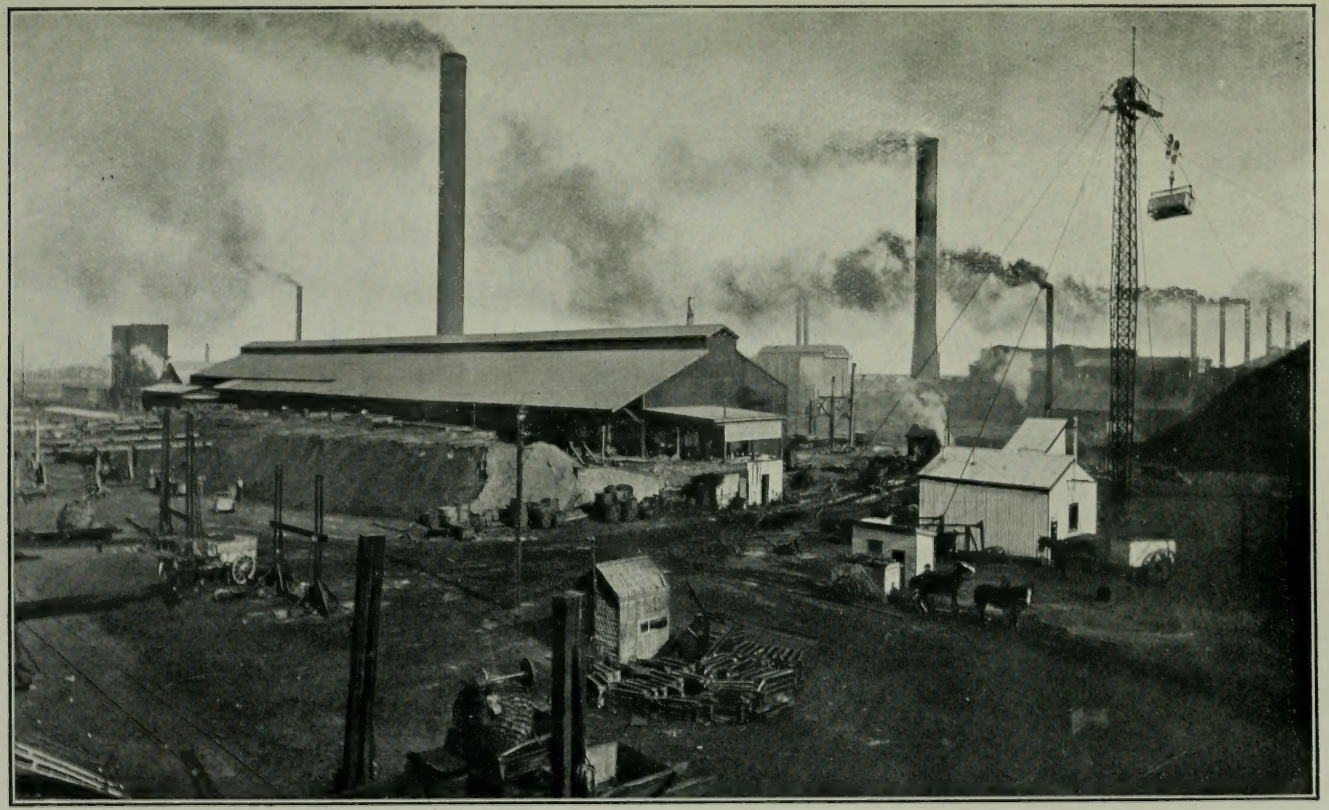
No. 6.—Hole, 5ft., vein 18in., 2·3 per cent. copper, 12·7 per cent. lead, 1oz. 2dwts. silver.

No. 7.—S.E. drive, 40ft., vein 18in., 16·4 per cent. copper, lead nil, 1oz. silver.

No. 8.—N.W. drive, 40ft. level, vein 12in., 0·8 per cent. copper, 28·6 per cent. lead, 14dwts. silver.

No. 9.—Bottom of shaft, 48ft., for 3ft., 0·3 per cent. copper, lead nil, 8dwts. silver.

The development to date is of a very encouraging nature and tends to confirm my former opinion of the ore channel, that it is likely to prove extensive and continue to go down. (3–12–15.)



Face p. 60.] Portion of Plant, Broken Hill Associated Smelters Pty, Ltd. [Photo by J. Johson.